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REVIEW ARTICLES

(1) **" The Present Position of Phenothiazine as an Anthelmintic ".**

(2) **" Trichomoniasis—A Review of Recent Literature ".**

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DISEASES CAUSED BY BACTERIA AND FUNGI

FRANCIS, J., & STEWARD, J. S. (1944). **The problems of bovine mastitis.**—*Vet. Rec.* **56.** 421–425. **1145**

The subject is dealt with separately by the two authors. FRANCIS deals with the physiology of milk secretion and in particular with the mechanism of "letting down" the milk and with the disturbances which occur during mastitis. Recent developments in the knowledge of mastitis are surveyed and F. concludes that mastitis is not a disease produced by modern methods of husbandry. He refers to a technique which is being developed for the assay of new drugs for the treatment of mastitis, chick embryos being used. Strains of *Streptococcus agalactiae* of known virulence to the embryo are inoculated into the chorio-allantois and the incubation of the egg is continued. The therapeutic agent is applied either locally, or by injection into the yolk sac, the latter as a means of studying systemic treatment.

STEWARD, dealing with the public health aspect of mastitis, points out anomalies of the present regulations, especially of section 25 of the Food and Drugs Act and the Milk (Special Designations) Order, 1936, and makes suggestions for their amendment.

With regard to diagnosis, he emphasizes palpation of the teat duct and examination of centrifuged samples for cream line and cytology of the deposit.

He claims that control of mastitis is possible by frequent conscientious clinical examinations and the appropriate measures to prevent spread of infection from affected cows so detected. He advocates the "Young Herds Scheme" for control of the condition, but several speakers in the discussion question the wisdom of this method in practice.—R. M. ARNOLD.

MILLER, W. T., & HEISHMAN, J. O. (1943). **Staphylococcal bovine mastitis : I. Artificial exposure of the bovine udder with Staphylococcus Aureus.**—*Amer. J. vet. Res.* **4.** 318–324. **1146**

Of the eight cows which were artificially exposed to udder infection, seven were lactating and one was dry. Examination of the udder prior to exposure did not show the presence of staphylococci. Milk samples from each quarter were tested at weekly intervals. The technique of the exposure was the same in each case. After the quarter had been milked dry, the end of the teat was washed and thoroughly disinfected ; 0·1 ml. of diluted staphylococcus culture was then injected into the teat canal, just beyond the sphincter, with a sterile 0·1 ml. syringe and a blunt-pointed 24-gauge needle. The injections were usually made in the morning and the cow was not milked again until 10–11 hours later. Seven strains of *Staph. aureus* were used, six isolated from milk, and one of human origin. Staphylococci in numbers varying from 700–30,000 per quarter were injected into 26 quarters on 55 occasions. Twenty-five exposures resulted in infection of 22 quarters. Variation was found among the different strains in ability to establish and maintain themselves in the udder. There were also differences in the susceptibility of the quarters to invasion by these organisms. With some strains, repeated exposure was necessary to bring about infection, and in these cases, a mild type of mastitis of a rather short duration developed. With other strains, which were better toxin producers, infection occurred after one or two exposures, and chronic mastitis of a persistent nature was established. The human strain produced a chronic mastitis after one or two exposures. It is concluded that *Staph. aureus* from both bovine and human sources can infect the udder by way of the teat canal. An effort to infect the udder by the intravenous injection of an 18-hour broth culture of a bovine strain was unsuccessful.

—R. M. LOOSMORE.

GRINI, O. (1944). Mastitisstreptococcenes diagnostikk. [**Diagnosis of streptococcal mastitis**].—*Norsk VetTidsskr.* **56.** 194–215. [English & German summaries.] [English summary copied *verbatim*.] **1147**

Diagnostic methods for determination of the mastitis streptococci, based on their hemolytic, fermentative and serological properties, are described. A large number of strains were investigated and the results are summed up.

Five strains of the streptococcus group I, serological group B, lacked the power of decomposing sodium hippurate. One of these strains failed to decompose salicin and effected a slight reduction of methylene-blue milk. Some of the strains showed a very pronounced power of forming pigment.

Gr. II was isolated from acute mastitis and belongs serologically to Gr. C. A strain which was isolated from the muscles of a cow also proved to belong here. Of Gr. C hemolytic strept. pyogenes, the most important was Gr. C a. Gr. III was also found in acute mastitis and in a couple of cases was the cause of serious attacks. Fourteen strains were subjected to close investigation. Gr. III is assumed not to be identical with the strept. acidominus. On the other hand, it appears from Ayres and Mudge's description that another of their groups (Gr. E) shows great resemblance to Gr. III and is supposed to be identical therewith, so that these authors are probably the first who have described the bacterium. Besides being obtained from milk secretion, Gr. III, was also isolated from the cervix uteri of a cow.

VON KLEIMENHAGEN, P. (1941). Ueber den Einfluss von Vitamin C auf tuberkulös infizierte Meerschweinchen. [**Effect of vitamin C on tuberculous guinea-pigs**].—*Z. Vitaminforsch.* **11.** 209–227. **1148**

Two lots of g. pigs, one averaging 240 g., the

other 480 g. live weight, which were maintained on a diet of old hay and bread, free of vitamin C, received injections of 200 and 100 tubercle bacilli respectively. The two lots were each subdivided into three groups, the groups of younger animals receiving daily a supplement of 0·5 mg., 1·0 mg. and 5·0 mg. respectively of ascorbic acid *per os*, while the older animals received levels of 0·5 mg., 2·5 mg. and 10·0 mg. The groups receiving 2·5 mg., 5·0 mg. and 10·0 mg. showed better growth and better general condition and survived for a longer period than those receiving smaller amounts. It is concluded from these results that the administration of high levels of vitamin C would probably be of value in cases of tuberculosis.—E. M. C.

BRETEY, J. (1941). Remarques sur le rôle joué par le régime alimentaire et par la vitamine C dans la tuberculose expérimentale du cobaye. **[Role of diet and vitamin C in experimental tuberculosis in the g. pig].**—*Ann. Inst. Pasteur.* 66. 453–472. **1149**

Experiments on g. pigs inoculated with tubercle bacilli showed that the dietary regime greatly influenced the development of tuberculosis. In animals on a vitamin C deficient diet, lesions developed rapidly and became widespread. Small doses of ascorbic acid tended to arrest the development of the disease, but large doses did not produce a correspondingly greater effect. Cabbage leaves were much more effective than ascorbic acid in this respect. The authors suggest the possibility that this may be due to the interaction of other constituents, such as vitamin P or vitamin A, present in vegetable material, or to the influence of some unknown factor.—E. M. CRUICKSHANK.

HOLLSTRÖM, E. (1942). **Some observations on the morphology of the tubercle micro-organism with special regard to its mycotic nature.**—*Acta med. scand.* **111.** 303–309. [In English]. **1150**

A particular strain of *Mycobacterium tuberculosis* [type not stated], when grown in glycerol broth, produced a transient turbidity during the first week of incubation. At this stage, Gram-positive, non-acid-fast diphtheroids were isolated which grew on plain agar. After eight days, elements which were partially acid-fast made their appearance, followed by small, ovoid acid-fast corpuscles. By the 20th day yeast-like cells were observed in small numbers. All these forms developed in the depth of the medium where the organisms had little access to atmospheric oxygen.

G. pigs inoculated with the atypical cultures died after long periods. P.M. examination revealed pronounced cachexia with or without purulent lesions in the lungs. Smears showed non acid-fast cocci or yeast-like cells with occasional acid-fast rods.

A series of coloured drawings shows the morphology and staining characters of the variants.—R. E. GLOVER.

*JUSATZ, H. (1942). Die epidemische Verbreitung der Tularämie beim Menschen in Europa. **[Tularaemia in man in Europe].**—*Med. Welt.* p. 822. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 101]. **1151**

Human tularaemia in Europe is associated with infection in rodents. In the Volga-Ural area 30% of water rats carry infection ; infection also occurs in field mice, and disease can be spread by the dust resulting from the threshing of grain which has been contaminated by their urine. The first tularaemia outbreak recorded in central Europe in 1936–37 was preceded by an epizootic in hares.

About 2,000 human cases are diagnosed annually in North America, and probably the disease occurs in many parts of Europe as unrecognized sporadic cases, or as epidemics. It is most prevalent in plain areas with a low rainfall, such as the Bohemian basin, Thuringia and the lower Oder.—U. F. RICHARDSON.

BENDIXEN, H. C. (1943). **Systematic combating of brucellosis, with a special view to large herds.**—*Skand. VetTidskr.* **33.** 705–736. [In English]. **1152**

B.'s earlier report [*V. B.* **11.** 3] on blood examinations of large dairy herds chronically infected with brucellosis is continued and extended. The material now covers 26 herds with a total of 3,363 milch cows.

In 12 of these herds no vaccination has been carried out. In seven, systematic vaccination of heifers has been carried on for seven years and records are now available of 939 cows which have been vaccinated as heifers. In the remaining seven herds, vaccination has been carried out for a few years only.

In the unvaccinated herds, 44·4% of the cows were reactors and of these 36·4% fell into the group bearing titres of 1 : 200 or over.

In the seven systematically vaccinated herds, 27·6% were reactors and of these 11·6% fell into the group having titres of 1 : 200 or over.

Since 80% or more of cows which excrete brucella in the milk, are found amongst those having a titre of 1 : 200 or over, B. presumes that the excretion of brucella has been greatly reduced in the herds where systematic vaccination of heifers has been carried out.

A more detailed study has been made of three large herds which have been under observation for a number of years and results of repeated examinations of the blood of a large number of individual cows are presented in tables. The regime adopted in these herds has been :– (a) Systematic vaccination of all heifers at the age of 8–12 months. In one herd, B.'s strain G was used and in the other two, the vaccine as prepared by the State Serum Laboratory. In both cases, living cultures were used. (b) The herds were self contained as far as possible. The only cattle added by purchase were stud bulls and heifer calves under the age of ten months which were vaccinated on joining the herd. (c) Calving cows were separated from the herd in special well disinfected calving boxes, and kept in these for 10 days after calving or longer if any abnormal discharge was present. (d) Mature cows were not allowed access to public common grazing grounds. (e) Cows which showed persistent high titre on successive tests were sold as opportunity offered.

In all these herds, following the adoption of this regime the percentage of reactors fell sharply after a period of 1–2 years and became stabilized at about 10%. This 10% consisted largely or exclusively of cows with low titres. At this stage, eradication of the disease by disposal of all reactors is possible without serious economic loss. Where this is done, and so long as the disease is prevalent and uncontrolled in neighbouring herds, B. advises that vaccination of heifers be continued.

Many useful observations on the effect of vaccination of heifers, fluctuation in titre etc., are included. Vaccinated heifers showed a transitory reaction to the agglutination test without any tendency to permanent reactions.—M. CRAWFORD.

CILLI, V., & PIO, A. (1943). L'infezione brucellare negli ovini e caprini del Bassopiano Orientale Eritreo. **[Brucellosis in sheep and goats in Eritrea].**—*Boll. Soc. ital. Med. Ig. trop.* **2.** No. 6. 43–47. [English summary]. **1153**

On the basis of allergic, serological and biological tests, the authors have established the presence of *Brucella melitensis* infection among sheep and goats of the lowlands of Eritrea. Some questions of comparative medicine are discussed, with a view to control.

—H. I. FIELD.

JONES, T. C., & MAURER, F. D. (1944). **Sporotrichosis in horses. Case report.**—*Bull. U.S. Army med. Dep.* No. 74. pp. 63–73. **1154**

The histology of the lesions, the cultural characteristics of the causal organism *Sporotrichon schencki*, and its pathogenicity for laboratory animals and a horse are described, and a table is given for the differential diagnosis of the disease from farcy, epizootic lymphangitis and ulcerative lymphangitis.

There was a crop of subcutaneous nodules on the forearm, breast and shoulder. At first these responded to local treatment with antiseptics, but later recurred. Later, treatment by excision was followed by recurrence, but surgical removal, combined with oral administration of potassium iodide, resulted in apparent cure.

The nodules varied in size from 1–5 mm. in diameter. The larger nodules had a purulent core and some had ulcerated. They did not show any tendency to coalesce and the lymphatics were not thickened. Microscopically, there was a necrotic centre surrounded by a zone of granulation tissue in which scattered giant cells were present.

Difficulty was experienced in demonstrating the organism in tissue sections from the naturally infected horse, but they were readily demonstrated in sections from experimentally infected laboratory animals.

The organisms grew best on media containing maltose, at room temperature and under aerobic conditions.

G. pigs and rabbits were refractory to infection; mice, rats and hamsters were susceptible; male hamsters were particularly susceptible and severe purulent orchitis was invariably produced. One young horse was inoculated with a culture subcutaneously and intradermally; nodules developed at the sites of inoculation but did not spread and eventually they disappeared spontaneously.—M. CRAWFORD.

MORNET, P. (1943). La péripneumonie bovine en Afrique Occidentale Française. Données anciennes et acquisitions récentes. [**Bovine contagious pleuro-pneumonia in French West Africa**].—*Bull. Serv. zootech. Epiz. A.O.F.* **6.** No. 1, 2, 3 & 4. 5–42. **1155**

A very good account is given of the characteristics of bovine contagious pleuro-pneumonia in French West Africa and the problems involved in its control. The disease was prevalent in 1914–18, but was then quiescent till 1940, when it appears to have been spread by cattle movements in connection with the supply of meat to the army. It is said that the disease smoulders amongst the herds of the nomadic tribes but is spread from them to the settled peoples by the activities of cattle traders. The mortality varies from 40–80%, but rarely exceeds 50%, humped cattle being more resistant than the non-humped animals. This resistance may be due to longer exposure to infection, resulting in the acquirement of hereditary resistance. In any herd which becomes infected a certain number of clinical cases occur, and a certain number do not develop clinical symptoms, but 10–30% of the herd are completely resistant, even if there has been no former exposure to the disease.

The difficulty in diagnosis of early cases, or of chronic infections, handicaps prophylactic measures.

The methods of immunization are described, and it is concluded that the culture vaccine can be an effective aid in the control of pleuro-pneumonia, the 25th–55th generation cultures giving adequate immunity. In humped cattle the vaccine can be injected in the shoulder, but in non-humped breeds the tail injection is safer. Immunity is established in 2–6 weeks and lasts a year.

Attempts to eradicate the disease in these territories are not advocated in view of the difficulty in controlling nomadic tribes, and the fact that with eradication immunity would be lost, and the re-introduction of the disease from neighbouring territories would then lead to heavy losses. Attention is drawn to the inability of Australia to effect eradication. [Some African territories have successfully eradicated this disease. The policy of maintaining immunity indicates a mistrust of neighbouring territories].—U. F. RICHARDSON.

See also absts. **1203, 1303** (staphylococci), **1351** (streptococci), **1305, 1306, 1345, 1366** (mastitis), **1363** ("summer mastitis"), **1235, 1346** (brucellosis), **1200** (TB., brucellosis), **1258** (salmonella in pigs), **1365** (anthrax, mastitis, Johne's disease, swine erysipelas and arthritis, necrotic enteritis, sheep brucellosis, control of bovine TB. and brucellosis, *Fusiformis necrophorus* in bovine liver abscess).

DISEASES CAUSED BY PROTOZOAN PARASITES

ABRAMOV, I. V. (1940). Sravnitel'noe izuchenie vozbuditelei "su-auru" verblyuda i loshadi. [**Comparative study of the causal agent of surra of the camel and the horse**].—*Trud. vsesoyuz. Inst. eksp. Vet.* **15.** 132–136. [French summary]. **1156**

A. investigated the specific relationship of two strains of surra trypanosomes isolated in Kazakhstan, one from a camel (V strain) and one from a horse (L strain). He refers to the work of various authors regarding the specific recognition of trypanosomes, and discusses the findings of earlier workers on surra in the U.S.S.R.

He considers that while the individuals of the camel strain were smaller than those of the horse strain, this is probably due to modification during passage in laboratory animals. The virulence, incubation period, and clinical course of the disease produced in mice, rats, g. pigs, rabbits, cats, sheep, and horses (results tabulated), revealed no significant difference between the two strains. In the first five passages through mice, however, the camel strain produced a chronic infection, while subsequent inoculations of this strain, and all passages of the horse strain produced an acute disease in mice. The Rieckenberg reaction indicated no difference between these strains and two laboratory strains of *Trypanosoma equiperdum*. This reaction is probably a group reaction. The trypanolysin test *in vitro* readily differentiated the V and L strains of surra trypanosomes from the laboratory strains of *T. equiperdum* but could not be used to distinguish the V from the L strain.

A. concludes that the two strains are identical, and belong to the species *T. ninae kohl-yakimoff* [= *T. evansi*]. He recommends that in the application of control measures against surra, horses and camels should be equally included.—J. ALLAN CAMPBELL.

*OLEG, S. (1941). Sulla trasmissione transplacentale del Trypanosoma brucei. [**Transplacental transmission of *T. brucei* infection**].—*Sperimentale.* **95.** 127. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 286]. **1157**

From a survey of the literature on intra-uterine infection with trypanosomes, O. concludes that in most cases this does not occur; exceptionally, however, infection of the foetus has been recorded in animals and in man.

Of 10 pregnant g. pigs inoculated experimentally with *T. brucei*, three produced healthy young, and seven died before parturition without the development of trypanosome infection in their foetuses. When, however, the placenta was pricked with a fine needle, the contained foetus became infected. Two pregnant infected g. pigs, repeatedly submitted to partial asphyxi-

ation by deprivation of oxygen, gave birth to four infected young and two trypanosome-free young. Out of 16 young, produced by five infected mothers which had received daily intraperitoneal injections of histamine during pregnancy, three were trypanosome infected. It is concluded that the normal placenta is an efficient barrier to the passage of trypanosomes, but that infection of the fœtus may result when damage allows direct communication between the parental and foetal blood. —U. F. RICHARDSON.

AYYANGAR, S. S. (1944). **Cutaneous trypanosomiasis in bovines.**—*Indian vet. J.* **20.** 195–196. **1158**

An account of six cases in which trypanosomes were present in rounded skin lesions almost the size of a pea, but absent from the circulation. No constitutional disturbance was observed.—M. A. KHAN (INDIA).

LLOVEROL, H., & PHILIPPE, J. (1943). A propos de deux cas de trypanosomiase aiguë du porc observés en Guinée Française. **[Two cases of acute trypanosomiasis in pigs in French Guinea].**—*Bull. Serv. zootech. Epiz. A.O.F.* **6.** No. 1, 2, 3 & 4. 52–69. **1159**

Two sows aborted and died in a piggery which also contained a boar and ten piglets. Trypanosomes were found in the blood of the sows, and one of the piglets was proved susceptible by inoculation. The inoculated disease proved fatal to pigs in 5–7 days, after an incubation period of 7–9 days. The experimental infection did not respond to treatment with atoxyl, naganol, tryparsamide, or tartar emetic given intramuscularly in oily suspension. Attempts to infect sheep, goats, rabbits, monkeys, g. pigs, and mice by subinoculation of blood were not successful.

The authors discuss whether the trypanosome infection caused the abortions, or the abortions caused a relapse to the trypanosomiasis, and also whether the correct name for this polymorphic trypanosome of the *T. congolense* type is *T. suis* Ochmann 1905, or *T. simiae* Bruce 1912. The authors adopt the view of SCHWETZ and of MESNIL in favour of *T. suis*.—U. F. RICHARDSON.

SEAGER, L. D. (1944). **Transmission of *Trypanosoma equiperdum* to the duck.**—*Science.* **100.** 428. **1160**

When ten one-week-old ducklings were inoculated intravenously with *T. equiperdum*, the parasites disappeared from the blood on the third day after inoculation, but reappeared on the 10th day in two which died on the 12th and 14th days respectively. Blood from the surviving eight birds revealed no parasites microscopically, but when inoculated into mice, produced trypanosomiasis and death, showing that the ducks harboured the parasite. Attention is drawn to the possibility that birds may act as reservoir hosts of mammalian trypanosomes.—U. F. RICHARDSON.

MACKICHAN, I. W. (1944). **Rhodesian sleeping sickness in eastern Uganda.**—*Trans. R. Soc. trop. Med. Hyg.* **38.** 49–60. **1161**

Outbreaks of sleeping sickness, involving 2,500 persons, in the Busoga district of Uganda have been found to be due to a trypanosome of the *rhodesiense* type, a strain pathogenic to man being isolated from *Glossina pallidipes*. Although *G. palpalis* occurs in parts of the area involved it is uncertain whether it was concerned as a carrier. Some evidence was obtained suggesting that this strain of trypanosome was introduced by labourers from Tanganyika Territory or the Belgian Congo, and it is unnecessary to assume that it was derived from the local strains of *T. brucei*.

The author also describes the form of the disease in human beings, which is atypical.—U. F. RICHARDSON.

*DARMAN, M. (1941). Multiplication du Trypanosoma cruzi dans le sang périphérique de la souris par passages successifs. Recherche de la prémunition vis-à-vis des souches homologues et hétérologues. **[Multiplication of *T. cruzi* in the peripheral blood of the mouse in passage experiments. Premunition with homologous and heterologous strains].**—*Ann. Parasit. hum. comp.* **18.** 166–179. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 287]. **1162**

Working with two strains of *T. cruzi*, one from Mexico which caused the death of 10% of mice into which it was inoculated, and one of low pathogenicity, isolated in Germany from an imported monkey, D. found that when the acute stage of the infection was over, reinoculation with the homologous strain had no effect. Premunization with one strain gave some protection against the other, as the superimposing of the virulent strain on the mild one gave either no infection, or only a very mild one.—U. F. RICHARDSON.

BOUGHTON, D. C. (1944). **The causes of outbreaks of bovine coccidiosis.**—*J. Amer. vet. med. Ass.* **105.** 74–77. **1163**

The carrier state and clinical infection obviously represent two different sorts of relationship between coccidia and their hosts. Two hypotheses have been advanced, to explain the occurrence of clinical coccidiosis in cattle. These are designated (1) the concentration hypothesis which argues that the overcrowding of susceptible hosts is usually the precipitating factor in outbreaks of coccidiosis and that the resulting concentration of infective oocysts will reach a point at which exposure results in clinical infection, and (2) the exacerbation hypothesis, as interpreted by Marsh [*V. B.* **8.** 569], which takes no account of a particular source of infection as being responsible for outbreaks of the disease. Conditions under which outbreaks occur are not appropriate for the sporulation of oocysts discharged by carriers. It is believed that severe winter weather coupled with changes in food render the intestinal epithelium more susceptible to coccidia. Clinical coccidiosis is regarded as the result of lowered resistance to invasion of parasites normally present in the intestines of cattle. B. criticizes the exacerbation hypothesis on the grounds that it is based on a misconception of the nature of low-grade coccidial infections in cattle, and on unproved assumptions that sporulated oocysts were not available to cattle in the feedlots described by Marsh, that dietary changes and bad weather increase the susceptibility of the intestinal epithelium to coccidia, and, finally, that the small numbers of coccidia present in the carrier at any one time have the reproductive capacity to produce clinical infections. B. concludes [correctly, in our opinion] that until data are presented in support of the assumptions upon which the exacerbation hypothesis is based, the concentration hypothesis is the more likely to provide a logical basis for a practical approach to the problems associated with outbreaks of clinical coccidiosis in cattle.—C. HORTON SMITH.

HAUSCHKA, T. (1944). **Season, nutrition, immunity, drugs and X-ray as factors influencing the course of a coccidian infection.**—*J. Parasit.* **30.** 162–172. **1164**

Seasonal incidence, vitamin effects and host resistance, host specificity and immunity, and the controlling action of drugs and X-rays on coccidia were investigated, using a species of *Adelina* and its host, the aquatic oligochaete, *Dero limosa*. Infected clones of *D. limosa* were found to succumb after two months' culture in a lettuce medium deficient in the vitamin B complex. Quinine sulphate, plasmochin naphthoate, and atebrin had no apparent effect on schizonts or gamonts of the *Adelina*; plasmochin was found to

double the frequency of abnormal sporogony to 19·1%, as compared with 10% of untreated control infections. Unfiltered X-rays of 1,000–7,000 r. interfered with fission of the host, and 30–100% of the total coccidian zygotes showed aberrant sporogony.

—C. Horton Smith.

*Corradetti, A. (1942). Il ciclo schizogenico degli emosporidi nell'ospite vertebrate. **[The schizogenic cycle of haemosporidia in the vertebrate host].**—*Riv. Biol.* **33.** 113–153. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 232]. **1165**

C. reviews the literature on the development cycle of haemosporidia in vertebrates, and particularly the endothelial development of *Haemoproteus*, and the sites of multiplication of species of *Plasmodium*. He points out that the preference of *P. elongatum* for erythroblasts is a special case, and that the phase of red cell invaded varies with the species of *Plasmodium*. The occurrence of endothelial schizogony has been established only for certain species of bird malaria. Claims that it occurs in man cannot be accepted as proved. It is considered that inoculated sporozoites can develop either in endothelial cells or in erythrocytes. The work of Missiroli is not discussed, and the views of Kikuth and Mudrow are rejected. The differences in the occurrence of endothelial schizogony in the plasmodia are accounted for by the grade of adaptation of the species to its host.

C. points out that the discovery of endothelial schizogony in *Plasmodium* removes the sharp distinction between that genus and *Haemoproteus*.—U. F. R.

*Corradetti, A. (1942). Osservazioni sulla biologia del Plasmodium gallinaceum nel tacchino. **[Observations on *P. gallinaceum* infection in turkeys].**—*Riv. Parassit.* **6.** 43–48. [Abst. from abst. in *Jber. Vet.-Med.* **70.** 498]. **1166**

P. gallinaceum infection of turkeys is identical with that of fowls. The percentage of parasitized blood cells is very small during the whole course of the infection. The blood cells may be free of parasites in cases where the endohistiocytic [exo-erythrocytic] cycle is present. The origin of this cycle is similar to that in fowls so that its biological value is the same.—C. Horton Smith.

Beaudette, F. R. (1944). **A natural case of canary malaria.**—*J. Amer. vet. med. Ass.* **105.** 91–92. **1167**

A dead, but not decomposed, canary was received for examination. P.M. examination showed acute swelling of the liver and spleen. The liver was negative to bacteriological examination. The blood, in a smear stained with Wright's stain, showed infection with a plasmodium. The nucleus of the host cell was displaced by gametocytes in which the pigment granules were coarse and elongated, and the parasite was thought to be *P. cathemerium*. The owner of the bird was advised to screen his outdoor cages against mosquitoes. B. states that no further deaths from malaria occurred but that ten young birds died later; according to the owner eight deaths were due to improper feeding and two from unknown causes. [B. does not say whether there was any confirmation of the owner's opinion.]

—C. Horton Smith.

Chen, T. T. (1944). **The nuclei in avian malaria parasites. I. The structure of nuclei in *Plasmodium elongatum* with some considerations on technique.**—*Amer. J. Hyg.* **40.** 26–34. **1168**

More than 1,200 nuclei of *P. elongatum*, found in the bone-marrow cells of canaries and ducks, form the basis of this study. The nuclei of the trophozoite, the schizont, segmenter, and gametocyte are described. The structure of resting nuclei in properly fixed and stained preparations, nuclear divisions of the asexual stages, and the question of whether there were modifications in nuclear structure when the parasites were transferred from one host (*e.g.* canary) to another kind of host (*e.g.* duck) are each considered. Smears of bone marrow, wet-fixed in a modified weak Flemming's fluid, followed by Feulgen's nucleal reaction with light green as a counterstain, produced sharp differentiation between nucleus and cytoplasm in trophozoites, schizonts and segmenters, the nuclei being usually stained brilliant red, purple or pink, while the cytoplasm appeared in various intensities of green. C. found a continuity of nuclear structure throughout the asexual development, in contrast to the sexual development from trophozoite to gametocyte where there were great structural changes. Changes of host produced no structural modification in the nuclei.—C. H. S.

Sergent, Ed. (1940). Parasites des paludismes et toxoplasmes. (A propos de parasites de la caille). **[Malaria parasites and toxoplasms from quail].**—*Arch. Inst. Pasteur Algér.* **18.** 374–401. **1169**

The observations carried out on the parasites of Algerian quail are of two kinds. One kind concerns the fact, already well substantiated, that toxoplasmoid bodies and multinucleate exo-erythrocytic forms occur simultaneously in the same bird. The other observation, which has not hitherto been recorded, is that the multinucleate forms seen in the quail are not all asexual schizonts but that some of them are gamonts. The co-existence of these diverse parasitic forms in the same bird raises the question of whether a pure or a mixed infection is present. If it is a pure infection, the free toxoplasmoid forms, the agamonts, and the endoleucocytic gamonts are all stages in the evolutionary cycle of the same parasite. If the infection is a mixed one, there are difficulties in explaining the co-existence of toxoplasmoid bodies and sporozoan agamonts and gamonts in the absence of other and confirmatory stages. The arguments of other investigators are summarized. The paper includes a valuable historical account of investigations carried out on toxoplasms and exo-erythrocytic schizonts observed in birds.—C. H. S.

Klyucharev, A. A. (1940). Piroplazmoz severnovo olenya. **[Piroplasmosis in reindeer].**—*Trud. vsesoyuz. Inst. eksp. Vet.* **15.** 114–119. [French summary]. **1170**

The disease was studied in the tundras north of Obdorsk (Yamal and Ural), from the Arctic Circle north to 68·5° N. Lat. It occurs throughout this area, but the precise north-south limits are not known. The disease runs an acute course in the autumn and becomes chronic in winter. Recurrence of acute symptoms is a frequent feature in spring, and is precipitated by various (often quite slight) factors, such as work, irritation from heat and flies, or other diseases (*e.g. Dictyocaulus* infestation) etc. Economic loss may be heavy, due to diminished working capacity and reduction of butter and cheese yield. With careful management losses of stock are comparatively slight.

K. describes the clinical symptoms [haemoglobinuria is not mentioned], pathological changes, and the course of the disease. Of the blood picture, he states that in acute cases 3–23% of the erythrocytes contain piroplasms, and 5–21% show polychromatophilia and punctate basophilia. Anisocytosis and poikilocytosis are evident. At about three weeks after infection, the blood begins to recover, and becomes normal in 4–6 weeks, at which time the disease becomes chronic. In the chronic phase, up to 2·7% of the corpuscles may be infected, and there is evidence of a seasonal variation in the degree of infection, but symptoms of anaemia do not occur. In relapses the infection rate of the corpuscles increases up to 23%, but anaemic

changes are less marked than in the primary attack; the animal frequently succumbs by the third day.

The causal organism exhibits a pronounced polymorphism. Eight morphological types are described and figured. Individual corpuscles may contain 1–4 parasites, and Maltese-cross forms occur. K. assumes that such multiple infections of the r.b.c. represent the results of division. In the course of the disease the proportions of the various types alter. The following proportions are approximate for acute and chronic cases respectively :– (1) round and oval forms, 60% and 32% ; (2) pear-shaped forms, 10% and 10% ; (3) elongated and club-shaped forms, 14% and 32%, and (4) anaplasmoid and other forms, 16% and 29%. K. concludes that earlier ideas regarding a multiplicity of causal organisms are probably due to the polymorphism and progressive change during the course of the infection, and that in the Obdorsk region there is only one causal organism, which is related to " *Theileria* (*Gonderia*) ". [It is presumed that K. refers to *Theileria mutans*, since he does not refer to schizogony in endothelial cells, and describes division in the erythrocytes (see BRUMPT, 1923 and THEILER & GRAF, 1928). The description given shows points of similarity with the recent description of changes in the morphology of *Nuttallia equi* by SALYAEV & DZASOKHOV—see following abst.].

The vector is unknown. Ixodid ticks have not been found in these tundras, but numerous mites (Trombidiidae) are present, and their occurrence in large numbers in autumn affords circumstantial evidence that they may play a part in transmission.

Symptomatic treatment only is used. K. reports on the tests with certain drugs administered to 15 reindeer. Of these, the best results were obtained with hexamine, and with arrhenal [sodium methyl arsenate] combined with trypanblue. Atoxyl and trypanblue each reduced the degree of infection. No action was observed with ichthargan, albargin, nor arrhenal administered individually.—J. ALLAN CAMPBELL.

SALYAEV, V. A., & DZASOKHOV, G. S. (1940). Morfologicheskaya kharakteristika vozbuditelya nuttallioza loshadeĭ po nablyudeniyam v Khakassii. [**The morphology of** *Nuttallia equi*].—*Trud. vsesoyuz. Inst. eksp. Vet.* **15.** 126–128. [French summary]. **1171**

Observations were made on 40 cases of equine nuttalliasis in Khakassia, and the causal organism was examined at different stages during the course of the disease, from its onset to the termination of symptoms. At all stages, the organism displays a polymorphism, and anisomorphism within the various types. In the initial stages of the infection, and in its acute course, large forms with compact nucleus and abundant cytoplasm predominate, but as the disease progresses the size of the organisms becomes reduced, until in the chronic stages small forms predominate, and anaplasmoid forms appear. The rate of reduction of the dimensions is greatest in acute and subacute infections, and the process takes place more rapidly in young horses and foals than in older animals. The diameters of the various forms of the parasite are tabulated for two cases, one acute and one chronic, *e.g.* ring-shaped forms in the acute case vary from 3·0μ (large), through 2·1μ (intermediate), to 1·7μ (small), large forms predominating, whereas corresponding diameters of this form in the chronic case are 2·0μ, 1·6μ, and 0·8μ respectively, and intermediate and small forms predominate. Morphological indices of structure and dimensions may thus serve to some extent as a basis for assessing the duration and intensity of the infection.

Parasites are rarely encountered outside the corpuscles, and in the majority they occur singly within the erythrocytes. Maltese crosses are frequently seen. Pear-shaped individuals usually occur singly, and when they are found in pairs, they lie parallel to each other and are never disposed with their thin ends in contact as in species of *Babesia*.

The authors consider that the disease in Khakassia is caused by a single species, which they regard as *Nuttallia equi*. They do not consider as valid the establishment of the species *N. minor* (1932). They suggest the need for a comparative study of the causal organism of all forms of *Nuttallia* infection in the U.S.S.R., especially on the basis of cross-immunity tests, and they state the belief that such a survey will possibly show the presence in all forms of the disease of one single polymorphic species of *Nuttallia* whose virulence varies in the different regions of the Union. —J. ALLAN CAMPBELL.

LLOVEROL, H., & PHILIPPE, J. (1943). Existence en Guinée de " Babesiella berbera ". [*Babesia berbera* **in French Guinea**].—*Bull. Serv. zootech. Epiz. A.O.F.* **6.** No. 1, 2, 3 & 4. 70–74. **1172**

The detection is recorded of a mixed infection of *B. bigemina* and *B. berbera* [= *B. argentina*] in blood smears of an animal in French Guinea. It is thought that the organism is rare as this is the first record of its occurrence, although *B. bigemina*, *Anaplasma marginale* and *Theileria mutans* are commonly encountered in blood smears. [*B. argentina* occurs in the peripheral circulation in only the early stages of infection. It is usually detectable only in organ smears.] —U. F. RICHARDSON.

RAY, H. N., & IDNANI, J. A. (1943). **Observations on the forms of** *Babesia gibsoni* **(Patton) in the dog ; with a note on the systematic position of the parasite.** —*Indian J. vet. Sci.* **13.** 267–273. **1173**

In the erythrocytes in the peripheral circulation two main forms were observed, (a) ring forms and (b) thin, elongated forms. In sections or smears of liver, spleen, and bone marrow there were erythrocytes with various developmental stages of the parasite. Multiplication took place by binary fission of the nucleus up to 32 individuals, not 2–4 as in the genus *Babesia*. Erythrocytes carrying single or multiple parasites in initial stages of development were not uncommon in the peripheral blood, but even when multiplication was advanced parasites from affected cells were not liberated into the blood stream, until 32 individuals were formed in one erythrocyte. The presence of large numbers of parasites in the peripheral circulation was not always attended by high temperature. It is tentatively suggested that the ring forms and elongated forms represent a sexual dimorphism, the ring forms being macrogametocytes and the elongate ones microgametocytes. Discussing the systematic position, RAY suggests that the parasite under study belongs to the sub-order Piroplasmidea but does not correspond with either of the two families Babesiidae and Theileriidae because of the mode of multiplication and the morphology of the parasite. A new family, Pattonellidae and a new genus *Pattonella* have therefore been proposed, and this parasite would be named *Pattonella gibsoni*.

LOTZE, J. C. (1944). **Carrier cattle as a source of infective material for horsefly transmission of anaplasmosis.**—*Amer. J. vet. Res.* **5.** 164–165. **1174**

Attempts to transmit *Anaplasma marginale* from carrier cattle by *Tabanus sulcifrons* were unsuccessful when anaplasms were not demonstrable microscopically in the blood, but were successful when a carrier animal was used in which 0·19% of erythrocytes contained anaplasms. The carrier animal had been inoculated with anaplasms a year previously, and showed no clinical evidence of disease with the temporary reappearance of the parasites in the blood. It is pointed

out that transmission from such animals may cause acute cases of infection, which can serve as the sources of further serious outbreaks.—U. F. RICHARDSON.

JUNGHERR, E. (1944). **Bovine leptospirosis.**—*J. Amer. vet. med. Ass.* **105.** 276–281. **1175**

Leptospira were found to be the cause of "mysterious" deaths of three adult cattle in Connecticut. In one animal illness developed at the height of milk production, and the only pathological lesion was a "nutmeg" appearance of the liver, which corresponded microscopically with extensive parenchymatous necrobiosis. Leptospira were present in the liver and kidneys. The other two cows developed post-parturient fever and died two days after calving. The gross pathology was characterized by oedema and haemorrhage in the udder, and abnormal striation of the cut renal surface. Preparations dealt with according to the method described by Levaditi revealed nests of leptospira in the kidneys in one case, and in the other case in an adjacent mesenteric lymph node.

As a relationship between bovine and human leptospirosis has been established in Russia, it is argued that cattle should be included in the concept of the cycle of leptospiral contagion in the U.S.A.—U. F. R.

See also absts. **1310**, **1313** (trypanosomes), **1318**, **1319** (leishmania), **1188** (*Encephalitozoon*), **1320** (rabbit coccidia), **1201** (*Plasmodium lophurae*), **1313–1317** (piroplasmosis), **1321** (leptospira), **1322** (venereal spirochaetosis of rabbits), **1365** (bovine and avian trichomoniasis, coccidiosis of lambs and calves, anaplasmosis), **1323** (action of gramicidin and tyrocidine on protozoa).

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

*SCHRAMM, G. (1942). Neuere Ergebnisse und Probleme in der Untersuchung der Virusarten. [**Virus research**].—*Dtsch. med. Wschr.* **68.** 791. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 317]. **1176**

Viruses are characterized by their filtrability through bacterial filters, and their inability to multiply on artificial media. If a virus has chemical homogeneity for which a chemical formula can be given then we must speak of an inanimate agent, rather than of an organism. The plant viruses, of which tobacco virus is the best known, belong to the chemically homogeneous group, and the electron microscope shows that the molecule has a size of 190 $\mu\mu$, and the ultracentrifuge gives a molecular weight of 23 million. The speed of movement in the electric field and quantitative estimations of reaction with antibody also throw light on the nature of the viruses. Chemical research shows that nucleic acid, which is a constituent of viruses, is incorporated in the polypeptide chain, and it appears that amine groups are not essential to the ability to multiply. It seems that no fundamental differences exist between the viruses of animals and those of plants, and that foot and mouth disease and rabbit papilloma viruses will be found to be homogeneous. The structure of larger viruses, such as that of cow pox, is not yet known. All these viruses are very complicated in chemical structure.—U. F. RICHARDSON.

NICKLE, M., & KABAT, H. (1944). **Specificity in the effects on brain metabolism of two differing neurotropic viruses.**—*J. exp. Med.* **80.** 247–255. **1177**

The effects of equine encephalomyelitis and mouse poliomyelitis viruses on mouse brain metabolism were studied. Aerobic and anaerobic activities were measured in the Barcroft-Warburg apparatus. Since infected and normal tissues showed a wide variation in oxygen consumption and in anaerobic glycolysis, the results were analysed statistically. Anaerobic CO_2 output was significantly below normal with both viruses when added glucose was high, but encephalomyelitic brain depressed it significantly in the presence of low glucose.

Further studies were made with lactate-glucose, pyruvate-glucose and succinate-glucose as substrates. Evidence was obtained suggesting that poliomyelitic brain showed an appreciable oxygen utilization in succinate-glucose.

In general, the metabolic effects observed were different as regards the two viruses and were quite specific.—R. E. GLOVER.

I. JANSSEN, L. W. (1941). Die Zentrifugierung und die Sedimentationskonstante des Maul- und Klauenseuche-Virusproteins. [**Centrifugation and sedimentation constant of foot and mouth disease virus protein**].—*Naturwissenschaften.* **29.** 102–103. **1178**

II. PYL, G. (1944). Bestimmung der Stabilitäts-pH-Zone des Virus der MKS. auf biologischem und physikalischem Wege. [**The relation of the pH of the substrate and the behaviour of the virus of foot and mouth disease**].—*Z. InfektKr. Haustiere.* **60.** 332–337. **1179**

I. Observations made using the analytical cell of the Svedberg centrifuge gave a sedimentation constant for F. & M. disease virus of 21 $\times$ 10^{-13} cm. per second per dyne. Further purification of the virus in a Beams vacuum centrifuge gave a figure of 17–18 $\times$ 10^{-13}. J. estimates the molecular weight of the virus particle to be 500,000–1,000,000. In his opinion the virus has the characteristics of an inanimate albumin particle and not those of a small micro-organism. He claims to have calculated that 1 ml. of vesicle lymph contains about 1 mg. of this virus albumin.

II. Results are briefly given of ultracentrifugation experiments to determine the sedimentation constant of the virus at different pH levels. Between pH 6·5 and 11, the sedimentation constant was 18 $\times$ 10^{-13} cm. per second per dyne, and between pH 6·5 and 1·8 it was 24 $\times$ 10^{-13}. This work is not described in detail but reference is made to a paper in the press by PYL and HOBOHM which may give a fuller description.

[The sedimentation constant as calculated by JANSSEN and by PYL is slightly lower than that recorded by SCHLESINGER & GALLOWAY (4–9 $\times$ 10^{-13}—see *V. B.* **8.** 85), ELFORD & GALLOWAY (5 $\times$ 10^{-13}—see *V. B.* **8.** 429) and LEPINE & GIUNTINI (33 $\times$ 10^{-13}—see *V. B.* **14.** 337, where this figure is incorrectly given as 33·1^{-13}). A number of factors might account for the difference between these groups of results, probably the most significant being the way in which the concentration of virus in the deposit is determined, the lower figures being based on optical measurement and the higher figures on biological activity.]

—W. M. HENDERSON.

—. (1944). **Rabies.**—*Mon. Bull. Min. Hlth emerg. publ. Hlth Lab. Serv., Lond.* **3.** 220–222. **1180**

Attention is drawn to the outbreaks of rabies which occurred in Great Britain after the last war during the years 1918–21.

The source of this re-introduction of the disease was the illegal importation of a dog at Plymouth in 1918, which escaped the vigilance of the authorities owing to the abnormal conditions prevailing at the time. Particulars of the action taken to eradicate the disease are given, and attention is drawn to the likelihood of a similar state of affairs occurring with the repatriation of large numbers of service personnel, who may attempt to introduce pet animals acquired abroad.—D. L. H.

—. (1944). **Report of special committee on rabies, Illinois State Veterinary Medical Association.**—*N. Amer. Vet.* **25.** 298 & 300. **1181**

A short review of the local difficulties of controlling the disease, with recommendations for legislative improvement.—W. M. HENDERSON.

ASSING, J. E. (1944). **The practical side of rabies.**—*J. Amer. vet. med. Ass.* **105.** 198–200. **1182**

This is an abridgement of a paper read before the Veterinary Medical Society of New York by the author, who was in charge of " dog bite " cases in the Borough of Manhattan for over 30 years. At the present time, over 10,000 persons are bitten by dogs every year in Manhattan, and over 25,000 in New York City. All persons bitten by stray dogs are advised to commence the Pasteur treatment, until such time as the dog, kept under observation by veterinary officials for a week if necessary, has been shown to be rabid or non-rabid ; the treatment continues if the dog proves to be rabid. In 1940, 100 persons were bitten by rabid dogs in the Borough of Brooklyn, but the only person to develop rabies, and die, was the one who refused to undergo treatment. The author mentions the symptoms of rabies in horses, and describes an instance when six horses, bitten by a rabid dog running down First Avenue, all developed rabies.—E. COTCHIN.

*—. (1938). Resumen de los trabajos sobre rabia y reglementacion. Instituto Nacional de Bacteriologia La Paz, Bolivia. [**Legislation in Bolivia for the control of rabies**].—*Anal. Inst. Victor Babes, Bucarest.* **9.** 134–137. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 25]. **1183**

A rabies vaccine employed by the Institute of Bacteriology, La Paz, since 1930 is described. The method of production is a modification of the Fermi technique attributed to Kraus and comprises 5% suspension of the brain and cord in 1% hypertonic physiological saline and 1% phenol, shaken constantly at 37°C. for 48 hours to hasten inactivation. Results have been satisfactory and there has been only one fatal case of vaccinal paralysis.—D. D. OGILVIE.

*MURAT, E., & BÉGUET, M. (1938). Remarques sur la statistique du service antirabique pendant 43 ans à l'Institut Pasteur d'Algérie. [**Forty-three years of antirabies vaccination at the Pasteur Institute, Algiers**].—*Anal. Inst. Victor Babes, Bucarest.* **9.** 137–140. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 24.] **1184**

In the Algerian Pasteur Institute, 64,677 persons have been vaccinated against rabies since 1894. There have been 233 deaths, of which 126 were ascribed to failure of the vaccine to protect. Only 12 cases of paralysis due to vaccination have been recorded. These were all in Europeans and only one was permanent.

—D. D. OGILVIE.

*GONZALÈS, P. (1938). Las vacunaciones antirrabicas effectuadas en España desde Julio de 1936. [**Antirabies vaccination in Spain since 1936**].—*Anal. Inst. Victor Babes, Bucarest.* **9.** 67–76. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 25]. **1185**

The mortality from rabies in persons exposed to infection and dealt with by rabies hospital services in the territory under the Spanish National Government since 1936 has been 0·44%. Mortality has been higher after the use of Hogye's method than when phenol vaccine has been used. Most cases of rabies have been in children, because of the frequency of multiple bites and their proximity to the head.

—D. D. OGILVIE.

*JÉZIC, J., & KODRNJA, E. (1938). Sollen wir Hunde mit lebenden oder abgetöteten Virus fixe preventiv gegen die Wut impfen ? [**Vaccination of dogs against rabies**].—*Anal. Inst. Victor Babes, Bucarest.* **9.** 106–110. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 25]. **1186**

In Yugoslavia a live rabies vaccine, prepared from a fixed virus from rabbits, sheep or dogs, in a 20% suspension with phenol and boric acid is now being used. With it some 7,000 animals have been vaccinated prophylactically and 3,000 following bites. The vaccine has been shown to be innocuous and results are satisfactory.—D. D. OGILVIE.

*REMLINGER, P., & BAILLY, J. (1942). Vaccination antirabique des troupeaux après contamination. [**Antirabic vaccination of animals of herds and flocks after some have been bitten**].—*Bull. Acad. Méd. Paris.* **126.** 123–125. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 26.] **1187**

Four herds in Morocco containing collectively 37 horses, 123 cattle, 113 pigs, and 8 sheep were bitten by rabid dogs. The animals of the herds and flocks were inoculated immediately with phenol vaccine prepared by the Pasteur Institute at Tangier and there were no losses. Comment is made on the rabies service necessary to provide sufficient vaccine at short notice for such inoculations.—D. D. OGILVIE.

MANOUÉLIAN, Y. (1942). Analogie des processus phagocytaires au cours de la rage des rues et dans certaines cellules végétales parasitées par des champignons. [**Analogy of the phagocytic process in street rabies and in certain vegetable cells parasitized by fungi**].—*Pr. méd.* Dec. 5th. 744. [Translation]. **1188**

M. points out the analogy between the formations which he considers to constitute the visible form of the rabies virus and which agglutinate to form the Negri bodies on the one hand and on the other hand, the formations which appear in certain plant cells (orchids) parasitized by fungi, the plant cells phagocytosing the fungus. He also draws a comparison between the elementary bodies described by him and *Encephalitozoon cuniculi*, the agent of microsporidian encephalitis in rabbits.

GRAY, J. S. M. (1943). **Note on an outbreak of cowpox affecting animals and milkers at dairy farms.**—*Med. Offr.* **70.** 61–62. **1189**

The origin of this outbreak was traced to the newly vaccinated child of a milker on a farm on which seven cows developed cowpox. The disease was transmitted by the sale of an apparently normal animal to another farm, where three cows and one milker became affected ; this milker milked a cow belonging to a third farm and there nine cows and two milkers contracted the disease.

—W. M. HENDERSON.

HIRST, G. K., RICKARD, E. R., & FRIEDEWALD, W. F. (1944). **Studies in human immunization against influenza. Duration of immunity induced by inactive virus.**—*J. exp. Med.* **80.** 265–273. [Authors' summary copied *verbatim*]. **1190**

The administration to human beings of formalin-killed influenza virus, concentrated from allantoic fluid, resulted in a high order of antibody response within 2 weeks after injection. Even after 1 year the great majority of individuals vaccinated had antibody levels considerably above their prevaccination titer for the PR8, Lee, and a current 1943 strain. An investigation of the occurrence of epidemic influenza A in seven widely separated populations, 1 year after vaccination of part of these groups, showed that the attack rate among vaccinated persons was consistently lower than that of control individuals. The average reduction in attack rate was of the order of 35 per cent.

ANDREWES, C. H., GLOVER, R. E., HIMMELWEIT, F., & SMITH, W. (1944). **Influenza virus as a laboratory contaminant.**—*Brit. J. exp. Path.* **25.** 130–134. **1191**

A recent investigation into an outbreak of influenza A virus in human beings, resulted in the recovery of two highly virulent mouse strains serologically identical with PR8 virus, and they were suspected to be " laboratory contaminants ". An examination of data collected over a number of years gives rise to a suspicion that accidents of this type may have occurred in a number of laboratories. In most instances, a strain identical with WS was recovered from mice by workers on influenza at a time when the prevailing epidemic was not of this type : in some instances the strain of WS virus had recently been received by the laboratory concerned. Fourteen such occurrences in ten institutes are cited.

In view of the claim made by EATON [*V. B.* **11.** 686] that influenza virus can be transmitted from infected to normal mice in close contact, experiments were undertaken to confirm these findings ; in general it was not possible to repeat Eaton's results. In any case, infection of normal mice is unlikely to explain " contamination ", as even in Eaton's experiments, infection did not spread from one cage to another.

No one explanation can be offered to account for the chance contamination with influenza that may have occurred in the instances under discussion. Inadequate sterilization of apparatus may have been responsible in some cases : others may be a genuine isolation of WS virus, although this seems to be unlikely. It is suggested that reports of the recovery of virus of high mouse pathogenicity and serologically resembling standard laboratory strains should be accepted with caution. Such findings would be more convincing if standard strains have not been under simultaneous study in the laboratory concerned.—R. E. GLOVER.

AKULOV, A. V. (1940). Patologicheskaya anatomiya pri infektsionnoĭ anemii loshadeĭ. [**Pathological anatomy of equine infectious anaemia**].—*Veterinariya, Moscow.* No. 2. pp. 148–160. [French summary]. **1192**

These are detailed studies on macroscopic and histological changes in various organs at different stages of the disease in 185 horses naturally infected with E.I.A., which died or were destroyed, and in 120 experimentally infected foals. Among the main changes were hyperplasia in the reticulo-endothelial system, degeneration of the parenchymatous organs, and haemorrhagic diapedesis. In acute and subacute forms, the main changes were a histiocyte type of reaction in the r.e.s., sharply pronounced degenerative changes of the parenchymatous organs, and marked diapedesis ; in chronic cases, a lymphoid reaction of the r.e.s., with simultaneous proliferation of the connective tissue predominated. Degenerative and haemorrhagic changes were less pronounced. The changes in the r.e.s. were more marked in recurrent cases and in prolonged attacks ; during remissions, these changes subsided. Prominent changes were observed in the liver, kidneys, heart muscle, and spleen, producing interstitial hepatitis, diffuse glomerulonephritis, and myocarditis. Although in chronic E.I.A., changes in the spleen resemble in some degree those of lymphadenosis, these conditions cannot be regarded as identical, as in E.I.A. there is a pronounced cell formation which is characteristic of inflammatory processes and is closely connected with the attacks. With regard to lesions and blood changes, E.I.A. should be classified as a haemolytic anaemia, the disintegration of erythrocytes probably being due directly to the virus.

The mechanism and development of the lesions are discussed in detail. In A.'s opinion the changes in the r.e.s. cannot be regarded as strictly specific for E.I.A. ; similar changes, although less pronounced, are observed in various conditions such as piroplasmosis, and in serum donors. They should be regarded as a type of allergic reaction to the absorption of the protein liberated by the broken-down blood cells, combined with a decrease in the red blood corpuscles.

Discussing the diagnostic value of macroscopic and histological lesions P.M., A. emphasizes the necessity of giving consideration also to the clinical and epizoological findings. There are 16 microphotographs.—A. M.

MORNET, P. (1943). La peste bovine en Afrique Occidentale Française en 1942. [**Rinderpest in French West Africa in 1942**].—*Bull. Serv. zootech. Epiz. A.O.F.* **6.** No. 1, 2, 3 & 4. 105–113. **1193**

Rinderpest occurred in all divisions of French West Africa during 1942, but in spite of shortage of staff, difficulty in getting transport and shortage of equipment owing to the war, the disease was kept under control and caused no serious losses. Native confidence has been established ; reports of outbreaks were made immediately and actually more immunizations were carried out than in any previous year. The most popular methods of immunization are serum-virus inoculation or vaccination with formolized virus. Native owners believe that after several vaccinations a permanent immunity is established. The objection to vaccination is its cost, but it has been found that by adding 1 part of aluminium hydroxide gel to 10 parts of formolized vaccine, the average immunizing dose can be reduced from 20 ml. to 2 ml.—U. F. RICHARDSON.

SELBIE, F. R. (1944). **Experiments on the transmission to the rabbit of the virus of contagious pustular dermatitis of the sheep.**—*J. comp. Path.* **54.** 161–167. **1194**

S. has isolated a filtrable agent from a case of contagious pustular dermatitis in a lamb, transmitted it to lambs and kids and established it in rabbits. This virus has been through 19 rabbit passages. The lesions in the rabbit are more proliferative than those usually seen in the natural disease, although they are comparable to the papillomatous lesions found on the lips of lambs.

S. considers that the filtrable agent established in rabbits was originally derived from the natural disease in the lamb, and that this is the first successful attempt to transmit contagious pustular dermatitis to the rabbit.
—D. L. HUGHES.

CHADDOCK, T. T. (1944). **Newer knowledge concerning mink distemper.**—*Amer. Fur Breed.* **16.** No. 11. 30, 32, & 34–35. **1195**

This was the subject of a lecture delivered to mink breeders. Mink distemper has been reported from nearly all parts of the U.S.A. and from certain sections of Canada. It attacks adult mink and kits as young as three weeks. While outbreaks occur at other seasons, the majority of cases are found in late summer and autumn. Differences in strain of virus are evident : with those strains which are not mink-adapted, typical external lesions appear later after infection than with adapted strains.

A rash develops on the lower jaw on the eighth day following infection, with some trace of crust formation around the eyes, and there is a rash on the abdomen. In advanced cases the foot pads become crusted or scaly, with enlargement of the feet up to several times the normal size ; the nose and eyes become encrusted. Autopsy findings include pneumonia, enlargement of the heart, distension of the gall-bladder, gastro-enteritis and an enlarged and mottled spleen. When the hide is scraped during pelting a distinct freckling is usually found on the abdominal skin.
—A. N. WORDEN.

LENNETTE, E. H., & KOPROWSKI, H. (1944). **Influence of age on the susceptibility of mice to infection with certain neurotropic viruses.**—*J. Immunol.* **49.** 175–191. **1196**

The authors have tested the susceptibility of mice at different ages (3, 8, 14, 21, 28 and 42 days) to the following viruses: Aujeszky's disease, Bwamba fever, herpes simplex, St. Louis encephalitis, West Nile disease, Japanese B encephalitis and Eastern, Western and Venezuelan equine encephalomyelitis. When inoculated by the intracerebral route their susceptibility to these viruses did not diminish significantly with increasing age, but extraneural inoculation of the viruses, subcutaneously or intraperitoneally, resulted in a decreasing susceptibility with increasing age. The age at which resistance first became measurable varied with the virus. Venezuelan E.E., however, was found to be capable of causing death at all ages by either the intracerebral or extraneural routes.

The authors conclude that resistance to peripheral inoculation of a virus does not entirely depend on the age of the mouse but also on the pathogenic properties of the virus.—D. L. HUGHES.

DELAPLANE, J. P., & STUART, H. O. (1943). **The propagation of a virus in embryonated chicken eggs causing a chronic respiratory disease of chickens.**—*Amer. J. vet. Res.* **4.** 325–332. **1197**

Investigations are described into an outbreak of respiratory disease which affected a flock of 5,000 laying birds. Clinically the disease resembled infectious bronchitis, but it had a longer incubation period and ran a more chronic course. It was characterized by a nasal exudate and repiratory rales together with a striking loss of body weight, and appeared to be of a slow-spreading type, persisting for weeks or months; mortality was low and not of appreciable significance. Egg production in the laying flock dropped to an average of about 30% of the normal.

Exudate from affected chickens, when inoculated into laboratory birds, immune to laryngotracheitis and infectious bronchitis, produced symptoms after 7–14 days; the possibility of infection with *Haemophilus gallinarum* was thus eliminated, since, in other experiments, symptoms had invariably appeared 24–48 hours after artificial inoculation with *H. gallinarum*; furthermore, bacteriological examination of material from infected birds failed to indicate the presence of *H. gallinarum*.

An infective factor was isolated, in which no micro-organism was demonstrable microscopically or culturally; this reproduced typical symptoms in mature birds and in young chickens after incubation periods varying from 6–17 days following inoculation and lasting from 21–68 days in individual birds. Disease in young chickens was similar to that observed in chicks on the farm from which the virus was obtained. It was characterized by a coryza which, however, was not sufficiently serious to affect growth. Chickens recovered from the "virus" infection and reinoculated appeared to be immune, but were susceptible to the virus of infectious bronchitis.

The virus was propagated in fertile chicken eggs through 35 passages, its growth in eggs being associated with death in approximately 25–50% of the embryos, after an incubation period of 24 hours. The remainder in most cases survived until hatching time. Lesions in the embryos were chiefly in the kidneys, but lesions occurred only in the chorio-allantoic membrane in embryos dying two or more days after inoculation. A large proportion of the chicks which hatched were weak and died after a few days. P.M. examination revealed kidney lesions similar to those seen in embryos failing to hatch. The technique of egg inoculation and harvesting was similar to that previously employed by these authors [see *V. B.* **13.** 18].—J. D. BLAXLAND.

THOMAS, L., & KOLB, E. M. (1943). **Relationship of the virus of the pneumonia (Baker) to the psittacosis-lymphogranuloma group of agents.**—*Proc. Soc. exp. Biol., N.Y.* **54.** 172–174. **1198**

The virus which BAKER [*V. B.* **13.** 212] has isolated from cat pneumonia forms elementary bodies that can be stained by Giemsa or Macchiavello's stain. It can be transmitted to mice by intranasal inoculation and grows well in the yolk sac of the developing chick embryo. On the basis of complement-fixation tests the virus was compared with NIGG's mouse pneumonia virus, and with the psittacosis virus derived from pigeons: it was found to be related antigenically to both these viruses. The BAKER virus resembles the NIGG mouse virus in that it is only pathogenic to mice by the intranasal route, but differs in this respect from psittacosis, meningo-pneumonitis and lymphogranuloma venereum. The authors suggest that the disease in cats may have been acquired from infected mice.

Morphologically and antigenically the virus of cat pneumonia belongs to the psittacosis-lymphogranuloma group.—D. L. HUGHES.

SMORODINTSEV, A. A. (1944). **Tick-borne encephalitis.**—*Amer. Rev. Soviet Med.* **1.** 400–408. **1199**

This consists of extracts from an original paper by S. [see *V. B.* **14.** 235, abst. 1498], comprising a review of the present knowledge of the aetiology, epidemiology, prophylaxis and treatment of Russian tick-borne or spring-summer encephalitis.—W. M. HENDERSON.

See also abstr. **1235** (F. & M. disease), **1324** (rabies, Aujeszky's disease), **1234** (encephalitis viruses, virus causation of canine hysteria), **1241** (panophthalmitis in deer), **1365** (E.E., E.I.A., swine fever, avian leucosis), **1202** (typhus).

IMMUNITY

RUSSEFF, C. (1944). Ueber eine Arbeitshypothese zur Erzeugung stabiler Immunität gegen Tuberkulose, Bruzellose und andere Infektionskrankheiten, für die der Zustand nichtsteriler Immunität charakteristisch ist. [**Resistance to TB., brucellosis, and other infections in which "non-sterile immunity" is characteristic**].—*Z. InfektKr. Haustiere.* **60.** 234–239. **1200**

It is argued that immunity in TB. and brucellosis depends on the persistence of the organisms in the body, and that it is not stable, as the organisms may be eliminated, or the defence mechanism of the host may be overcome. Living bacilli can produce a long period of immunity, but it is argued that the characters of strains cannot be fixed, and the use of living bacilli in vaccines is never devoid of danger. For practical use the bacilli must be killed, but this must be done without altering their molecular structure. Mechanical destruction has been suggested, but some have claimed that the bacilli can be reformed from granules, and even that an ultra-virus form exists. If, however, mechanical destruction were final, the product could be used to produce immunity which could be reinforced periodically. Other methods of destruction suggested are exposure to a pressure of up to 20,000 atmospheres, particularly as high pressures are associated with low temperatures, and R. considers that the bacilli can be destroyed by a temperature of −80°C. A practical proposition would be the grinding of the bacilli in a suitable colloid mill, of which specimens have been manufactured in

Germany. In this case, the ground bacilli could be treated with liquid air with which a temperature of −180°C. can be obtained.—U. F. RICHARDSON.

RIGDON, R. H. (1944). **Effect of heparin on phagocytosis. Observations on *P. lophurae* in the chick.**—*J. Lab. clin. Med.* **29.** 840–849. [Author's conclusion copied *verbatim.*] **1201**

There is no evidence from this study to support the opinion that heparin inhibits the process of phagocytosis of malarial parasites. The parasitemia is less in chicks given heparin immediately following the injection of the parasites than it is in the controls.

Heparin apparently has no effect upon either the agglutination of human red blood cells by heterologous serum or the agglutination of typhoid bacilli by immune sera. Heparin has no effect, apparently, on previously formed clots of normal and parasitized chicken blood. The role of heparin in other of the fundamental biological processes is briefly referred to.

SERGENT, ED., & HORRENBERGER, R. (1944). Utilisation de la chèvre pour la préparation du vaccin non vivant contre le typhus exanthématique avec du virus provenant de pneumonie rickettsienne provoquée. **[Preparation in the goat of a non-living vaccine against exanthematic typhus].**—*Arch. Inst. Pasteur Algér.* **22.** 8–10. **1202**

In attempts to obtain for vaccine manufacture larger supplies of rickettsia than could be obtained in mouse lung, the lungs of rabbits, dogs, sheep and goats have been successfully infected with *Rickettsia prowazeki*, the organism of exanthematic, or epidemic, typhus. The lungs of goats have proved more suitable than those of other animals. [No details are given of the method of infection, or the method of vaccine preparation].—U. F. RICHARDSON.

TAGER, M. (1941). **Factors modifying the reaction of alpha staphylolysin to heat.**—*Yale J. Biol. Med.* **14.** 69–88. [Author's summary slightly amended.] **1203**

Alpha staphylolysin of Wood 46 strain, produced on heart infusion broth in modified Casman shake-cultures, is relatively heat stable.

Inhibiting agents, liberated by the staphylococci, are described. The inactivation of lysin at lower temperatures (60°C.) and reactivation at higher levels (80°–100°C.) is influenced by these agents. The maximal zone of inactivation is between 53° and 70°C.; there is no significant effect up to 50°C. Higher concentrations of inhibitors may mask the lysin heated at higher temperatures.

The release of lysin at higher temperatures may be due to the partial heat lability of the inhibitors themselves or to a dissociation of the lysin-inhibitor complex.

Many other substances, unrelated to the staphylococci, may exert similar effects on the thermostability of the lysin.

Changes in the hydrogen–ion concentration of the lysin, before it is subjected to heat, may modify this reaction in either direction.

ROBINSON, E. S., & FLUSSER, B. A. (1944). **Studies on pyrogens. I. The isolation of pyrogens from various microorganisms.**—*J. biol. Chem.* **153.** 529–534. **1204**

Details are given of the isolation from T.A.B. vaccine, *Pseudomonas pyocyanea*, and *Proteus vulgaris* of substances which caused a rise of temperature when injected intravenously into rabbits. These pyrogens contained no nitrogen, and were probably of carbohydrate nature, but it was not determined whether or not they were pure chemical entities.—E. COTCHIN.

See also absts. **1162** (premunity in *T. cruzi* infection), **1365** (trichina antigens), **1226** (serodiagnosis of cancer), **1183**, **1185**, **1186** (rabies vaccines), **1190** (immunization against influenza), **1193** (against rinderpest), **1155** (against bovine contagious pleuro-pneumonia), **1221** (against *Haemonchus*).

PARASITES IN RELATION TO DISEASE [GENERAL]

WRIGHT, W. H., CRAM, E. B., & NOLAN, M. O. (1942). **Preliminary observations on the effect of sewage treatment processes on the ova and cysts of intestinal parasites.**—*Sewage Wks J.* **14.** 1274–1280. **1205**

Twenty-six samples of sewage sludge from California and Arizona, and 75 samples from 17 army camps, were examined by zinc sulphate flotation for the presence of helminth ova and protozoan cysts. In the first group of 26 samples, the only helminth ovum found was one of *Hymenolepis* sp. In 27 of the samples from army camps, however, helminth eggs were found, *Ascaris lumbricoides* occurring most frequently, and others being those of *Trichuris trichiura* and *Hymenolepis* sp. It was demonstrated that ova recovered during the various stages of the sewage treatment processes were viable. It is pointed out that the use of sewage sludge as a fertilizer may serve to disseminate helminth ova of these species.

A species of amoeba morphologically similar to *Entamoeba histolytica*, but having different cultural requirements, was found in the sludge. It appeared to be closely related to *E. moshkovskii* described as occurring in sewage waters in Moscow.—T. E. G.

See also abst. **1368** (text-book).

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

*BRUMPT, E. (1942). Notes parasitologiques concernant l'aménagement agricole de la Crau. **[Parasitology in relation to agricultural practice in Crau, France].**—*Ann. Parasit. hum. comp.* **19.** 74. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 316]. **1206**

These notes are concerned with medico-entomological conditions at the mouth of the Rhone. Among the mosquitoes present, *Aëdes* is represented by several species. Cattle are worried by gadflies, simuliids, and species of *Culicoides*. In a note on midge control the establishment of fish of the genus *Gambusia* is recommended.—U. F. RICHARDSON.

HEPBURN, G. A. (1943). **Sheep blowfly research I. A survey of maggot collections from live sheep and a note on the trapping of blowflies.**—*Onderstepoort J. vet. Sci.* **18.** 13–17. **1207**

NOLTE, M. C. A. (1943). **Sheep blowfly research II. Suint investigations.**—*Ibid.* 19–25. **1208**

HEPBURN, G. A., & NOLTE, M. C. A. (1943). **Sheep blowfly research III. Studies on the olfactory reactions of sheep blowflies. IV. Field tests with chemically treated carcasses.**—*Ibid.* 27–48 & 49–57. **1209**

HEPBURN, G. A. (1943). **Sheep blowfly research V. Carcasses as sources of blowflies.**—*Ibid.* 59–72. **1210**

I. It was felt that before commencing blowfly research at Onderstepoort a survey of the blowfly position should again be made. As a result of the examination of collections of maggots from all the provinces of the

Union, it was found that 55% were composed solely of *Lucilia cuprina*. The majority of strikes in Natal and the Transvaal were made by *L. cuprina* and *Chrysomyia chloropyga* in combination. As a result of trapping experiments with blowflies in order to find their seasonal frequence, it was found to be important in comparing catches to use selective baits for the particular species concerned, as different species are attracted by meat in different stages of decomposition.

II. An investigation of suint was undertaken, which embraced two distinct projects, (1) basic work on suint to find what constituents are attractive to blowflies and (2) a qualitative and quantitative analysis of a series of fleece samples from selected examples of susceptible and non-susceptible sheep. An attempt was made to isolate and estimate some of the organic acids, chiefly lower fatty acids, but this was not accomplished. Benzoic acid was demonstrated several times. Suint preparations did not attract flies in the olfactory tests. These tests were carried out with an early type of olfactometer. Unfortunately they could not be repeated later with an improved type of instrument.

III. The type of olfactometer used in II was not very satisfactory, but later a cage olfactometer was used with more success. Of all the substances tried for their attractive properties for blowflies none was superior to chemically treated beef bait. Substances such as cystine, calcium carbonate, calcium sulphide etc., used for treating meat made it more attractive. Bacterial cultures from sheep's intestines acting on the meat further increased its attractiveness. Fermenting fish meal, pancreatin, and egg were less attractive than meat. Some of the attractive substances of beef were extracted but were not identified. The flowers of *Stapelia flavirostris* were strongly attractive to and stimulated oviposition in *L. cuprina*. Extracts of these flowers were attractive but the substances responsible were not isolated.

IV. The object of these experiments was (1) to regulate, if possible, the pH of carcasses at a stage attractive to primary flies and (2) to try to find a poison which would control the pH and at the same time, render the carcasses toxic to visiting flies and their progeny. The pH of opened carcasses could not be controlled satisfactorily by dusting chemicals on them and it was not found possible to maintain the pH at a stage attractive to flies. The attractiveness of carcasses and meat baits appears to depend on a number of factors and the pH alone does not appear to be a sufficient criterion for attractiveness. The experiments, which were tentative, showed that reliable data cannot be obtained unless several replicate tests are carried out concurrently, which would entail a great deal of work in the handling of traps.

V. A series of experiments was carried out to study the blowflies on sheep carcasses and on those of a number of small animals. From these experiments it was found that *C. chloropyga* does not breed in carcasses in summer. *C. marginalis* and *C. albiceps* are particularly successful in summer, but *C. marginalis* does not breed to any extent in the winter. The longer the exposure in summer, the greater the percentage of *C. marginalis* in the final blowfly population. *C. marginalis* is attracted to carcasses in the first stage of decomposition. *L. cuprina* and *L. sericata* are usually the first visitors to fresh carcasses. It is desirable to foster methods of dealing with carcasses which would encourage *C. marginalis*, as this species does not strike living sheep, and is a valuable scavenger. In summer this might be accomplished by burying carcasses three days after the death of the animal.

—E. M. Robinson (S. Africa).

Bonsma, H. C., & de Vries, A. H. (1943). **Control of the sheep blowfly. II. Selection and breeding for less vulnerable merino types.**—*Fmg S. Afr.* **18.** 581–586. [For previous article, see *V. B.* **14.** 379, abst. 2423]. **1211**

It is a moot point whether the merino has not assumed a conformation extremely vulnerable to blowfly attack as a result of breeding policies in the past. Blowfly attacks are mainly concentrated in the crutch of ewes. Up to 50% of the attacks occur on the tail and along the vulva. In merino lambs the tail should be docked to a length of no less than 4 in., since, if it is too short, the folds around the vulva are continually wetted by urination. Ewes without median and lateral folds are much less susceptible to blowfly attack. A ram with a plain breech should be used with the ewes. The main onus of producing the right type of sheep will fall on the stud breeder.

—E. M. Robinson (S. Africa).

*Séguy, E. Etude biologique et systematique des sarcophagines myiasigènes du genre Wohlfahrtia. [**Systematic and biological study of maggot flies of the genus** *Wohlfahrtia*].—*Ann. Parasit. hum. comp.* **18.** 220–232. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 98]. **1212**

A short review is given in the original article of what is known of the biology of the genus, with a table of the characters by which species can be distinguished. *W. volucris* is described as a new species from Tunisia.

—U. F. Richardson.

*Suurküla, J. (1942). Durch Dipterenlarven verursachte Augenkrankheiten (Ophthalmomyiasis). [**Ocular myiasis**]. pp. 41. Stuttgart: Verlag Enke. [8vo] [RM. 2.20]. [Abst. from review in *Dtsch. tropenmed. Z.* **47.** 264]. **1213**

This work is stated to cover all records of ocular myiasis in man described up to the time of publication. In the lids and orbital cavity, larvae of *Dermatobia cyaniventris* and *Wohlfahrtia magnifica* are usually involved, whilst *Oestrus ovis* invades the conjunctival sac. Thirty cases have been recorded of invasion of the eyeball by dipterous larvae, giving a clinical picture of relapsing irido-cyclitis. *Hypoderma*, *Wohlfahrtia*, *Sarcophaga*, or *Calliphora* may be involved, *Hypoderma* being most frequent. The larvae reach the eye directly, and not by way of the blood stream. In addition to the clinical picture, information is given regarding the morphology and the biological characters of the flies concerned.—U. F. Richardson.

Wilson, S. G. (1943). **Cattle ticks and their control by dipping in Nyasaland.**—*Nyasaland agric. quart. J.* **3.** No. 4. 15–24. **1214**

A popular account is given of the importance of ticks as transmitters of diseases of stock in Nyasaland, and their control by dipping. A list is given of the principal ticks and of the diseases which they transmit. [This list includes *Boophilus decoloratus* as the transmitter of *Babesia bovis* ; *B. bovis* is, however, a European piroplasm and it is doubtful whether it occurs in Africa.] A clear account is given of dipping requirements, the precautions required to prevent poisoning, the necessity for hand dressing, and the method of treating arsenical poisoning. Hand-dressing solutions recommended are :– 1 part 7% nicotine and 8 parts crude oil, or 3 tablespoonfuls 40% nicotine extract and 1 tablespoonful concentrated dipping solution (64% As_2O_3) mixed with ½ lb. Stockholm tar and then stirred into 10 lb. axle grease.

In some areas " blue ticks " [*B. decoloratus*] have been found to possess an arsenic tolerance, and in these cases the dipping fluid may be made up to contain

0·04% nicotine, or 100 lb. waste tobacco per 1,000 gal. dipping fluid.

As a substitute for freshly prepared ferric hydroxide as an antidote, the author advocates the use of photographic " hypo " (sodium thiosulphate). As a drench, large animals may be given up to two tablespoonfuls of " hypo ", and this dose may be repeated in half an hour. At the same time, 2–10 grammes of " hypo " in 30 ml. of water, warmed to blood heat, may be given intravenously, this injection being repeated in 12 hours. [In the *United States Dispensatory* (1940) it is stated that in experiments quoted, sodium thiosulphate was ineffective as an antidote for arsenical poisoning.]

—U. F. Richardson.

*Hohorst, W. (1942). Das Vorkommen von zwei seltenen Zecken, Dermacentor marginatus Sulzer, 1776, und Haemaphysalis concinna Koch, 1844, im Hessischen Ried. [**The occurrence of *D. marginatus* and *H. concinna* in Hesse**].—*Senckenbergiana.* **25.** 94–99. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 99]. **1215**

Adults of *D. marginatus* [= *D. reticulatus*] are very common in the early spring on sheep in the Worms area of western Germany. It is thought that the larvae and nymphs feed on rodents. The imagoes may appear in the late summer, but their activity is usually delayed till the early spring. They cause the wool to become ragged and to fall out in patches. *H. concinna* and *Ixodes ricinus* also occur in this area.—U. F. R.

*Schulze, P. (1942). Die Gestaltung des Mitteldarmes bei den Zecken und die Einrichtungen für die Körperdehnung bei der Blutaufnahme (nebst Beiträgen zur Lebensgeschichte der Ixodoidèa). [**The mid-gut of ticks and the mechanism of stretching of the abdomen when feeding**].—*Zschr. Morphol. Oekol. Tiere.* **39.** 320–368. [Abst. from abst. in *Jber. Vet.-Med.* **71.** 224–225]. **1216**

The arrangement of the mid-gut diverticula is described, and their function in absorbing material to meet the needs of the next stage of development is discussed. It is suggested that the change in number of hosts from many to few, with, finally, the one-host ticks, has governed the extent of the gut surface. Similarly, to meet the risks of failure to find a suitable host, the egg production of ticks feeding on ambulatory hosts may reach 18,500, whilst those which feed on cave- or burrow-dwelling animals lay only 450–830 eggs. A greater supply of blood is required by species which need to produce large numbers of eggs, and their system of diverticula is more highly developed. A special mechanism to allow of body expansion is described. [The German abstract gives no information as to this mechanism.]—U. F. Richardson.

*Serra, G. (1942). Contributo allo studio dell' infezione cutanea da demodex. [*Demodex* **infection of skin**].—*Ann. Pat. Parassit.* **3.** 257–270. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 100]. **1217**

A summary is given of our knowledge of the aetiology of *Demodex* infection in man and animals, and two severe infections in negroes and one in a calf are described.—U. F. Richardson.

See also absts. **1364** (sheep blowfly), **1367** (ticks), **1325–1328**, **1364** (insecticides), **1174** (vector of anaplasmosis), **1365** (vectors of E.I.A., of anaplasmosis, ox warble control, sheep ked).

PARASITES IN RELATION TO DISEASE [HELMINTHS]

Maqsood, M. (1944). *Echinococcus* **cyst in the kidney of a cow.**—*Indian vet. J.* **20.** No. 6. 260–261. **1218**

The occurrence is recorded of a sterile *Echinococcus* cyst, of the size of a pigeon's egg, in the cortex of the right kidney in a six-year-old cow. This is believed to be the first record of the occurrence of such a cyst in the kidney in an Indian host.

—H. D. Srivastava (India).

*Budde, H. (1942). Untersuchung über den Parasitenbefall westfälischer Rinderbestände zu verschiedenen Jahreszeiten. [**Study of parasitism of Westphalian cattle**].—*Inaug. Diss., Hanover.* [Abst. from abst. in *Dtsch. tierarztl. Wschr.* **51.** 115]. **1219**

B. investigated the relationship of parasitic disease in Westphalian cattle to climate, methods of husbandry, and nature of the soil. Of the moderately infested herds three with the heaviest infestations and under different methods of management were selected, and the progress of the parasitic infestation throughout the year was investigated. The largest numbers of cases of parasitic infestation were seen in the farms where the animals had access to pasture or were stall fed with green food, and the lowest numbers on the farm where the animals were maintained in stalls without green food. Infestation was heaviest on all farms in July and decreased thereafter until December and February. An increase in infestation followed until June on the farms where pasture feeding or stall feeding with green fodder was practised. On the farm where stall feeding without the use of green food was practised a rise in egg count was seen in April ; this was regarded as due to special conditions making possible infection in the stalls. Suggestions are made for the control of parasites on individual farms.—T. E. Gibson.

*Pigoury, L. (1943). A propos d'une " épidémie " de trichinose à Beyrouth (Liban). [**Outbreak of Trichinosis in Beyrut, Syria**].—*Bull. Soc. Path. exot.* **36.** 88–94. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **144.** 424]. **1220**

A single case of human trichinosis was found in Lebanon in 1939–40 and on investigation most of the cases in pigs were found in a large breeding establishment of more than 2,000 head. The food of these pigs consisted of offal from a knacker's yard and refuse from the city, which, when fed to experimental animals, set up infection in 15% of cases. The public health official, fearing spread of the disease by the faeces of the infested animals, caused the whole herd to be slaughtered for food and, as a result, trichinosis was spread in all the districts surrounding Beyrut. The veterinary laboratory of the army of the Levant was then entrusted with the inspection of meat for the presence of trichinae. The infection rate was found to be 1·3% in 1940 and 0·54% in 1941. In Syria trichinosis is not a serious problem, as so many of the inhabitants are prevented by religious custom from consuming pork. Pigs are used almost exclusively as food for Europeans.—T. E. Gibson.

Mayhew, R. L. (1944). **Studies on bovine gastro-intestinal parasites. VII. Attempts to develop an active immunity to *Haemonchus contortus* by injection of a saline extract of adult worms.**—*Proc. helminth. Soc. Wash.* **11.** 43–45. [For part V, see *V. B.* **12.** 39. Part VI not traced]. **1221**

400–500 *H. contortus* collected from slaughtered calves were washed 2–3 times in normal saline and then ground in a mortar together with fine sand. After standing for 2–3 hours, the extract was centrifuged and filtered through a Seitz filter, 5 ml. of extract being obtained. The extract was used for the intramuscular or subcutaneous injection of calves in an attempt to produce an active immunity. Three calves were used and were given repeated doses of 2 or 4 ml. of the

extract and later, together with three control calves, were inoculated with infective larvae. Judging by the egg counts, no protection was acquired.—T. E. GIBSON.

ANDREWS, J. S., KAUFFMAN, W., & DAVIS, R. E. (1944). **Effects of the intestinal nematode, *Trichostrongylus colubriformis*, on the nutrition of lambs.**—*Amer. J. vet. Res.* **5.** 22–29. **1222**

Five wether and two ewe lambs were used to determine the effect on their nutritional state of experimental infestation with *T. colubriformis*. Of five lambs infested, two developed pronounced clinical symptoms and died. Although there was much variation, feed consumption records and growth studies showed that the infested lambs consumed an average of almost twice as much food per lb. of live weight gain as the controls. The apparent digestibility coefficients of the food constituents were unchanged by the infestation except in the case of one lamb which died, in which diarrhoea and partial starvation were accompanied by a negative N balance and mineral balance. Analyses showed that bone composition was affected only in those lambs which were clinically affected for relatively long periods. Without exception, however, the lambs required more energy per lb. of live weight gain than did the controls. The guanidine content of the blood of one lamb affected with diarrhoea due to the infestation was elevated by 100%.

The data do not confirm the observations of STEWART [*V. B.* **4.** 748] that worms alone cause a depression of the apparent digestibility coefficients of crude protein and crude fibre. The lowered efficiency of growth as judged by the food utilization of all the infested lambs may have been due to local nerve irritation and intestinal inflammation, while in those with diarrhoea it was probably the result of increased intestinal activity and of retention of guanidine in the blood owing to the severe and prolonged dehydration.
—K. L. BLAXTER.

CHOQUETTE, L. P. E., & SWALES, W. E. (1944). **Studies on factors influencing the health of pigs. II. The incidence of the roundworm (*Ascaris lumbricoides*) in pure-bred bacon pigs in Canada, with observations on age of susceptibility and effects on growth.**—*Canad. J. Res.* Sect. D. **22.** 53–59. [For part I, see *V. B.* **13.** 434.] **1223**

Infections with *A. lumbricoides* were found in 75% of 1,090 pigs in the Advanced Registry Pig Testing Stations conducted by the Dominion Department of Agriculture. Approximately 60% of the pigs acquired *Ascaris* infestation during the nursing period. A majority of the heavy infestations were acquired during very early life and most of the later ones were comparatively light. There was no significant difference between severity of infestation and time of year at which the pigs were born. There was only a difference of 0·05 lb. gain per day between pigs free of *Ascaris* and those passing more than 10,000 eggs per gramme of faeces at some period of their lives. Egg counts were only a rough means of determining the number of worms: female worms only were found in three out of eight pigs passing no eggs in the faeces. This suggested that the presence of males is necessary for egg production and that unfertilized eggs are not produced in appreciable numbers. The infestations recorded were not highly pathogenic in pigs over two months old which were kept under good conditions of nutrition and housing. The authors consider that the finding that the pigs with the highest infestations gained at a lower rate than those that had no worms is barely significant and must be interpreted guardedly. The worms could have been the cause of the decrease in rate of gain, or they could have been retained because of another weakness, *i.e.*, they might be either cause or effect.
—RONALD GWATKIN (CANADA).

BURNS, H. C. (1944). **Observations on heartworm in British racing greyhound kennels in Nassau.**—*J. Amer. vet. med. Ass.* **104.** 325–327. **1224**

Blood tests on 14 greyhounds exported from England showed that all became infected with heartworm [*Dirofilaria immitis*] in less than six months after arriving at the Bermudas. 50 pups, reared from the adults, became positive to the blood test at an average of eight months after birth. Evidence is submitted to show that mosquito-proof kennels substantially decrease the incidence of the disease.—G. B. S. HEATH.

See also absts. **1365** (liver fluke in Texas, trichinosis, *Strongyloides ransomi* in pigs, capillaria of chickens), **1205** (viability of helminth ova), **1329–1333** (anthelmintics).

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

GREAT BRITAIN. **British Empire Cancer Campaign. Twenty-first annual report 1944.** [LOCKHART-MUMMERY, J. P.] pp. 95. London: British Empire Cancer Campaign. [4to]. **1225**

This is a record of steady progress in many fields of cancer research and it is gratifying to know that after so many years of war, the study of cancer in this country is being undertaken with even greater intensity than before. The income of the Campaign for the year ending July 31st, 1944 marks a new high level.

Among the very large number of items referred to in the report, a few of some comparative interest are selected for mention here. The value of stilboestrol in carcinoma of the prostate has been amply confirmed: treatment of cancer of the breast with triphenylchloroethylene (a synthetic oestrogen) or with stilboestrol was less successful, but striking results in some patients seem to warrant further study of this form of therapy. It is well known that different species of animals respond differently to carcinogenic action, *e.g.* whereas the skin of the mouse responds rapidly to many hydrocarbons the rabbit's skin is refractory: it has now been found that 9 : 10-dimethyl-1 : 2-benzanthracene rapidly induces first papillomas and then epitheliomas when applied to the rabbit's ear. The virus of sheep dermatitis has been found to produce papillomatous outgrowths of the skin in rabbits, whereas when transferred to g. pigs, the resulting lesions are similar to those occurring in sheep, *viz*, a papulo-vesicular eruption. When Rous tumour virus is injected intravenously, a period of 6–7 days elapses before tumour growth can be detected; during this interval there occurs an inflammatory reaction in which mononuclear cells accumulate at the site of localization of the virus. Epidermal tumours may be induced in mice by a single application only of benzpyrene if the skin is subsequently treated with a non-carcinogenic agent which causes epithelial proliferation; hyperplasia may thus be an important factor in determining the occurrence of tumours. Substances inhibiting cell division exert the opposite effect; thus if the skin is first painted with cantharidin, the subsequent application of benzpyrene fails to produce tumours.—E. G. WHITE.

MAYER, M. E. (1944). **Review of serodiagnostic tests for cancer.**—*J. nat. Cancer Inst.* **4.** 571–578. **1226**

M. reviews the better known tests which have been applied to the serum of patients in the diagnosis of cancer. They are divided into three main groups, (1) measurement of various chemical constituents of the blood or of chemical or physical characteristics dependent on these constituents, (2) immunological tests and (3) measurement of the proteolytic or lipolytic activity of the serum. There are 60 references.

—E. G. White.

Strong, L. C. (1944). **Genetic nature of the constitutional states of cancer susceptibility and resistance in mice and men.**—*Yale J. Biol. Med.* **17.** 289–299. [Author's summary copied *verbatim.*] **1227**

In an attempt to duplicate or imitate in experimental animals the variable genetic background of man, hybridization of mice and selection toward resistance to methylcholanthrene-induced local tumors were affected. Under these controlled experimental conditions a great number of cancers were produced in mice. In fact, the mice far exceeded expectations by giving rise to a very high incidence of multiple malignancies. The data indicate, therefore, that biological variability, as determined by genetic determiners, is responsible for the various types of cancer found in mice and possibly in man also. The production of the selected NHO strain of mice now makes available, for further research, under controlled conditions in experimental animals a wealth of new neoplastic diseases, some of which, such as cancer of the stomach, will unquestionably be of especial value in view of the prevalence of this type of cancer in man.

Eschenbrenner, A. B., & Miller, E. (1944). **Studies on hepatomas. I. Size and spacing of multiple doses in the induction of carbon tetrachloride hepatomas.**—*J. nat. Cancer Inst.* **4.** 385–388. **1228**

The induction of hepatomas in mice by repeated administration of carbon tetrachloride was first reported in 1941. Three large doses were shown not to produce tumours, whereas 25–30 doses at intervals of 2–3 days produced tumours in 41 of 58 mice. The authors describe the first of a series of experiments on the effects of varying the time and dose in carcinogenesis by repeated dosage. A series of 30 doses of carbon tetrachloride (0·0001–0·0016 ml.) in olive oil were given by stomach tube at intervals varying from 1–5 days and the animals which did not die were killed after 150 days. The incidence of liver tumours increased with the total time over which the 30 doses were spaced and progressively less carbon tetrachloride was needed as the duration of dosage was prolonged. No tumours developed in control animals receiving olive oil only.

—E. G. White.

Emmart, E. W. (1944). **Origin of hepatoma E of strain C3H mice.**—*J. nat. Cancer Inst.* **4.** 537–538. **1229**

In 1938 this transplantable hepatoma was obtained from a primary tumour from the liver of a mouse, which was one of a group of seven which had received repeated subcutaneous injections of 2-amino-5-toluene for a period of twelve months. Repeated implantations were accompanied by an increase in the proportion of successful " takes " and by a reduction in the time required for tumour development. With the fortieth transplant generation the tumour became palpable 14 days after implantation. Material has been distributed to various laboratories for further studies.—E. G. W.

Williams, W. L. (1944). **The effects of gastric mucin on the growth of transplanted tumor (lymphosarcoma) cells in mice.**—*Yale J. Biol. Med.* **17.** 311–318. [Author's summary and conclusions copied *verbatim.*] **1230**

In mice, gastric mucin did not favor growth (upon transplantation) of a lymphosarcoma. Tumor growth did not follow the subcutaneous injection of these neoplastic lymphocytes suspended in a solution of mucin in normal saline (31 animals). Tumor growth attended intraperitoneal injection of the same material in 21 of 25 animals.

Transplantation (subcutaneous and intraperitoneal) was always successful when the tumor tissue was injected as a suspension in normal saline or directly grafted as a small piece of tissue. Apparently, the mucin inhibited growth of the transplanted tumor by augmenting the local " foreign body " and inflammatory processes to such a degree that the neoplastic cells were destroyed. The limited areas involved in the subcutaneous sites seemed to favor these processes which destroyed the tumor cells. In the peritoneal cavity the reaction was not sufficient to prevent effectively the growth of the transplanted tumor cells. This was perhaps due not only to the greater size of the area involved but also to the apparently mild inflammatory response of the serosal lining and of other possible phagocytic elements of this site to the mucin-tumor mixtures.

Nelson, W. O. (1944). **The induction of mammary carcinoma in the rat.**—*Yale J. Biol. Med.* **17.** 217–228. [Author's summary copied *verbatim.*] **1231**

The administration of estrogenic substances by injection or by implantation of pellets in rats induced the appearance of mammary carcinoma in 68 of 103 animals which survived treatment long enough to permit the development of cancer (at least 300 days). It seems probable that some animals are resistant to the final stages of the neoplastic process which leads to the development of mammary carcinoma.

The various cases were distributed through several types of carcinoma. Duct carcinoma, 42 rats ; adenocarcinoma, 8 rats ; mixed duct and adenocarcinoma, 13 rats ; carcinoma simplex, 5 rats. Metastases to lymph nodes or to lymph nodes and lungs were observed in 33 animals.

Gardner, W. U., & Dougherty, T. F. (1944). **The leukemogenic action of estrogens in hybrid mice.**—*Yale J. Biol. Med.* **17.** 75–90. [Authors' summary copied *verbatim.*] **1232**

1. Hybrid mice of 16 different groups were either treated with one of several different estrogenic chemicals or maintained as untreated controls.

2. Of 1403 estrogen-treated mice 165, or approximately 12 per cent, died with lymphoid tumors and 34, or 4·5 per cent, of 739 control mice died with tumors of the same type.

3. Hybrid mice born of parents of two strains susceptible to estrogen-induced lymphomas had a high incidence of such tumors, 40 and 45 per cent, while no tumors occurred in the untreated controls.

4. Hybrid mice born of parents one of which was susceptible to estrogen-induced leukemia and one resistant showed incidences intermediate between the parental stocks.

5. Hybrid mice born of parents from two strains resistant to estrogen-induced leukemias had in one instance higher and in one instance lower incidences of lymphomas than the parental strains.

6. The incidence of spontaneous lymphomas among the untreated mice was high in three groups (11·5 to 20 per cent). Among the mice of these groups the incidence of myeloid metaplasia was also high and two mice showed erythroblastic neoplasia.

7. The lymphoid tumors were of the same types as described as occurring among mice of the parental inbred strains.

HUTT, F. B., COLE, R. K., BALL, M., BRUCKNER, J. H., & BALL, R. F. (1944). **A relation between environment to two weeks of age and mortality from lymphomatosis in adult fowls.**—*Poult. Sci.* **23**. 396–404. **1233**

For seven years, 1936–1942, from 1,759–2,232 White Leghorn pullets were housed annually, having been reared as far as possible under the same conditions except for the first two weeks of life. For the first 14 days each hatch was brooded alternately in one of two different brooder houses, the only difference between them being that one, Room F, was 40 ft. from adult birds whilst the other, Room B, was over 100 ft. away. In both cases, the attendants divided their time between chicks and adults. Two strains resistant to lymphomatosis and one strain susceptible to this disease were used.

Mortality every year in mature pullets 160–500 days old was higher amongst those started as chicks in Room F than in those started in Room B. Much of this difference was due to the higher incidence of neoplasms (90–95% of which were cases of neural, visceral or ocular lymphomatosis) among the birds from Room F. In 1940, 1941 and 1942, deaths from neoplasms were 1·6–4 times as frequent in the birds from F as in those from B. This difference was found in both resistant and susceptible strains but over the whole period, the incidence of lymphomatosis was higher in the susceptible strain from B than it was in the resistant strains reared in F. Both strains also showed a seasonal decline in susceptibility in the last three hatches (after April 15th each year). This was especially marked from 1936–1940.

It is concluded that the chicks from Room F had a more severe exposure to the causative agents of lymphomatosis than those in Room B or that there was something in the environmental conditions to heighten their susceptibility to these agents. The only feature likely to have caused a greater exposure to infection was the difference in the proximity of adult birds to the two brooder houses. The reason for the apparent seasonal decline in susceptibility to this condition was not explained.—J. D. BLAXLAND.

See also absts. **1365** (avian leucosis), **1334** (chemotherapy of cancer).

DISEASES, GENERAL

—. (1943). **Proceedings, thirty-ninth annual convention, Kansas Veterinary Medical Association, Manhattan, Kansas, January 11-12, 1943.** pp. 103. Manhattan, Kansas: The Association. [8vo]. **1234**

Papers reviewing the existing literature on the following diseases were presented for discussion.

Brucellosis and vaccination [DYKSTRA, R. R.]—The subject is a controversial one, and the value of the present method of vaccination is unproved.

Bovine mastitis, a symposium. A paper on "*Anatomical aspects*" [MCLEOD, W. M.], illustrated by lantern slides, was followed by one on "*Newer agents of treatment*" [SANDERS, E. F.] and one on "*Treatment with Ty-Sin* [? tyrothricin]" [WENDT, D. O.].

Acute hypoglycaemia (*baby pig disease*) [MUNCE, T. W.]—The cause of this very lethal disease of young pigs is unknown. Blood sugar content is always low. Measures recommended in controlling the disease are the feeding of a liberal grain ration to the sows during pregnancy and attention to sanitary measures. The affected young pigs should be hand fed with milk containing 8–10% butter fat, the necessary amount of cream being added.

Infectious types of enteritis in swine [MUNCE, T. W.]—Salmonella enteritis, swine dysentery, protozoan enteritis, and coccidiosis were considered.

Swine erysipelas [MUNCE, T. W.]—The clinical aspects, course, symptoms, lesions, and diagnosis were described, together with methods of handling affected herds and preventing spread to infection-free herds.

A general discussion took place on the known methods of control and treatment of pig diseases.

The relation of human and animal encephalitis [RODERICK, L. M.]—The group of equine neurotropic virus diseases contains five recognized types of equine encephalomyelitis which can scarcely be differentiated from one another, *viz*, the Eastern and Western North American types, Borna disease, the Moscow strain, and the Venezuelan strain. The first two types are known to affect human beings in the U.S.A. There are eight distinct forms of epidemic encephalitis which are a cause of disease in man; these include rabies, poliomyelitis, Australian "X" disease, St. Louis encephalitis, "louping ill" of sheep, and Japanese "B" encephalitis. While listeriasis is a bacterial form of encephalitis, sporadic rather than epidemic in its occurrence, it is pathogenic for man, cattle, sheep, and pigs. Bovine encephalomyelitis [Buss disease] appears to be a disease primarily of cattle.

Diseases of the nervous system of dogs [SCHLOTTHAUER, C. F.]—Parasites and certain diets are contributory causes, but some predisposing factor is essential for the development of fits or convulsions. Hypocalcaemia has been noted by REIHART [unpublished] in puppies infested with worms and subject to fits. A deficiency of thiamine has been found among dogs suffering from fright fits. The subcutaneous or oral administration of thiamine prevents the occurrence of these symptoms. SCHLOTTHAUER & BERRYMAN (1942) have been unable to produce any type of nervous symptom in dogs fed on a variety of diets said by others to cause such symptoms. Reference was made to the literature on conditions in which there are symptoms of nervous disorder: the neurotropic form of distemper, rabies, encephalitis, meningo-encephalitis and hydrocephalus. Intracranial tumours (rarely) and injuries to the brain or cord also cause nervous symptoms. Dogs have also been shown to be susceptible to the Western strain of equine encephalomyelitis virus when this is inoculated. In the discussion, the importance was emphasized of excluding such possible causes of convulsions as digestive disturbance due to an obstruction in the alimentary canal. S. thought many cases of hysteria were due to a virus disease which is spread to animals in contact. He was convinced that distemper virus could cause encephalitis and become neurotropic at times.

Special sessions were also held to discuss control of sheep scab and brucellosis.—J. A. GRIFFITHS.

—. (1941). Problemy bor'by c brutsellezom i yashchurom na plenume Veterinarnoĭ sektsii Vsesoyuznoĭ akademii s.-kh. nauk im. V.I. Lenina. [**Report on the discussion on control of brucellosis and foot and mouth disease at the plenary session of the Veterinary Section of the All-Union Academy of Agricultural Sciences**].—*Veterinariya, Moscow.* No. 1. pp. 134–142. **1235**

This is a short report on the meeting of the Veterinary Section held from November 25th to December 1st, 1940. Over 500 representatives of medical and veterinary research organizations, and of government and local organizations took part in the discussions and presented papers.

Considerable successes in the control of brucellosis were registered, as compared with the previous year. Reports from eleven chief veterinary officers showed improvement in various districts [no particulars]. It is stated that in the Ukraine, 88% of the state breeding farms were freed of abortion by removing the reactors to the agglutination test and segregating reactors to the intradermal test. There were discussions on difficulties met locally, and criticism on the lack, in some cases, of organization and co-ordination. A suggestion was made that control should be centralized in order to eradicate brucellosis in the whole of the U.S.S.R. The value was recognized of the intradermal test (for cattle as well as sheep) as a diagnostic measure.

Papers were presented on various aspects of bovine, ovine and porcine brucellosis, on various methods of vaccination (live vaccines prepared from specially selected and attenuated strains are said to be still in the experimental stage), on spontaneous recoveries, chemotherapy, etc. [Many of these papers have already been abstracted in the *Vet. Bull.*] Interesting papers were also presented on the epidemiology of brucellosis in human beings. It is stated that in the U.S.S.R., contact infection is prevalent among personnel occupied in sheep farming and coincides with the lambing period. Infection by inhalation, among wool sorters, was also observed.

Most of the papers on foot and mouth disease dealt with various vaccination methods. Satisfactory results were reported from various districts from the use of aluminium-hydroxide adsorbed vaccines, chloroform vaccines, and chloroform-saponin vaccines. Several papers on the viability of the virus and on different types of virus were also presented. The meeting adopted a resolution recommending the preparation of, and research on, polyvalent vaccines, on the further investigation of the types of virus, and on the suitable disinfection of animal products. It was emphasized that active immunization should be regarded as a part of a general complex of control, the main attention being given to quarantine and police regulations.—A. Moldawsky.

Smith, H. A. (1944). **Ulcerative lesions of the bovine rumen and their possible relation to hepatic abscesses.**—*Amer. J. vet. Res.* **5.** 234–242. **1236**

In the U.S.A. 5·25% of the livers of all cattle slaughtered are condemned as a result of "liver abscesses", causing an annual loss of about two million dollars. In an effort to determine whether lesions of the four stomachs are related to abscess of the liver a special study was made at Denver, Colorado, where the incidence of liver abscess was 13·3% of all cattle slaughtered and was the highest recorded from any part of America.

The stomachs of 1,807 cattle were examined and the presence or absence of liver abscesses determined in each animal. The abomasum and omasum proved to be free from any lesions which might possibly give rise to liver abscess, but the rumen, and to a minor degree the reticulum, showed a variety of lesions indicative of past or present injury. Where liver abscess was present microscopic sections were made of the abscess and of any lesions in the rumen.

The lesions found in the rumen fell into eight different categories which are described and illustrated. The different lesions appeared to be different stages in the same process and varied from patches of black or yellow and black material, adherent to the mucous membrane, to ulcers in varying stages of healing, with the formation of a scar. The macroscopic and microscopic appearances of the various lesions are described.

That lesions in the rumen could give rise to abscesses in the liver by the transport of organisms through the portal blood vessels is obvious.

A table summarizing the frequency with which lesions occurred in the rumen and in the liver is given. 26% of all the cattle examined had lesions in the rumen and 18% had liver abscesses. Of the cattle with lesions in the rumen 42% had abscesses in the liver, while these were found in only 9% of those without ruminal lesions. Conversely, 62% of the animals having liver abscesses had lesions in the rumen, while only 18% of those without liver abscesses had them.

Of the 1,807 cattle examined 35 had damaging foreign bodies in the reticulum. A nail or piece of wire was not infrequently found in one of the folds of the mucosa without penetrating the wall, but it was not classified as a damaging foreign body. Of the cattle which had abscesses in the liver only 6·5% had damaging foreign bodies.

The low incidence of foreign bodies in the stomachs of the animals examined is attributed to the fact that the cattle were predominantly beef cattle from open ranges and not housed cattle.

The bacteria found in the stained sections were Gram-negative filaments, cocci and diphtheroids. The types in a given animal were usually similar in both liver and rumen.

The evidence supports the belief that there is a definite relationship between ulcers of the rumen and abscess of the liver in cattle.

A short summary of the limited literature on the subject is given.—M. Crawford.

Pillai, M. R. (1944). **A note on chronic luxation of patella among bovines with special reference to its aetiology.**—*Indian Vet. J.* **21.** 48–55. **1237**

A brief clinical account of the condition, with comments.—J. M. Lal (India).

Kästli, P. (1943). Der Euterkatarrh. **[Udder catarrh].**—*Landw. Jb. Schweiz.* **57.** 366–417. [French summary]. **1238**

The condition described is not mastitis but a condition characterized by the production of milk with a sharply salty taste which is usually considered as unsuitable for sale or for cheese making. Such milk has a large sediment, has a raised catalase figure, and is alkaline to the bromthymol test, using as critical figures 0·03% sediment, catalase number 10 on reading the result after 30 min. and 20 on reading it after three hours, and a bright green to blue colour in the bromthymol test.

Udder catarrh was very prevalent in the area of the Berne Cheese and Dairy Society in 1941, affecting 73% of 871 milk samples tested. On investigation, it was determined that the condition was most common in cows of the age group 6–7 years, in cows giving 9–15 litres of milk daily, and in cows in the early stage of lactation.

A great deal of attention was paid to the bacteriology of the affected udder, but in view of the common finding of bacteria in udders secreting normal milk, it was not possible to incriminate any organisms: indeed, udder catarrh probably has no specific bacterial cause. The amount of sediment also had no connexion with the presence of any particular organism, nor had the catalase figure or pH reaction. Cases having no resident bacteria are probably the result of an injurious method of milking—the method called "Knödeln" which is commonly used in Switzerland. It is desirable to educate milkers to abandon this method in favour of that employing the whole hand.—J. E.

Jamieson, S., & MacIntosh, R. M. (1944). **Some observations on bovine vaginitis with special reference**

to control with silver picrate compound.—*Vet. Rec.* **56.** 509–511. Discussion pp. 511–512. **1239**

The authors describe an infectious granular vaginitis in cattle with a corresponding affection in bulls which appears to be common in Aberdeenshire and which, if uncontrolled, may lead to severe herd sterility. The disease was observed on 12 farms, on three of which it was widely disseminated throughout the herd and associated with sterility. An investigation into control of the disease was carried out in a herd of pedigree Shorthorns, composed of six bulls, 64 cows, 15 heifers, and ten calves. All the above animals except the calves appeared to be affected.

The condition in the females was found in different stages of activity. The principal clinical appearances were the presence of small dark red lenticular nodules radiating from the clitoris, and a catarrhal inflammation starting at the clitoris and spreading rapidly towards the cervix and accompanied by nodule formation.

In the males, similar nodules were noted on the penis with a tendency to bleeding from the preputial sac in two cases.

Cultural examination failed to reveal any organisms similar to *Streptococcus vaginitidis*, nor was *Trichomonas foetus* demonstrated.

Treatment by douching with antiseptics such as a dilute iodine solution had no curative effect, but tended rather to reactivate the disease. Entozon had no curative value in the females, but in the males entozon bougies were of definite curative value.

Insufflation of 1% silver picrate and kaolin into the vagina of 79 females controlled the disease. Recovery was effected in one month and normal breeding ensued.

—D. A. MacPherson.

Quin, J. I. (1943). **Studies on the alimentary tract of merino sheep in South Africa. VIII.—The pathogenesis of acute tympanites (bloat).**—*Onderstepoort J. vet. Sci.* **18.** 113–117. [For part VII, see *V. B.* **15.** 201.] **1240**

In order to determine whether the rate of gas production in the rumen could in itself determine the onset of acute bloat, the forestomachs were insufflated with air. Even large quantities were belched up, as much as six litres per minute. It was shown that normal eructation of gas is impeded as a result of excessive foam production in the forestomachs, especially when the diet is restricted to green lucerne. Saponin in the lucerne retards the breaking up of the foam through its action on surface tension. If green lucerne is fed to ruminants only after other foods have been consumed, undue frothing of the ruminal ingesta can be controlled.

—E. M. Robinson (S. Africa).

Rosenfeld, I., & Beath, O. A. (1944). **Contagious panophthalmitis in deer.**—*J. Wildl. Mngmt.* **8.** 247–250. **1241**

In the spring of 1943 this disease was noticed amongst a herd of mule deer; it caused temporary but rarely permanent blindness. No cultural or transmission experiments were undertaken, but as no bacteria could be demonstrated microscopically it is suggested that the disease may have been due to a virus. Both eyes were affected in succession, and there was a kerato-conjunctivitis with a discharge, causing excoriation of the surrounding skin. P.M. examination revealed, in addition, oedematous degenerations affecting the ciliary body and processes, retina, optic nerve and parts of the brain. A similar though milder condition is found locally in cattle.—R. A. Roper.

I. Quigley, G. D. (1944). **The effect of wheat upon the incidence of pullet disease or blue comb.**—*Poult. Sci.* **23.** 386–391. **1242**

II. Quigley, G. D. (1944). **Germination differences of wheat utilized in a study of pullet disease.**—*Ibid.* 547–548. **1243**

III. O'Neil, J. B., & Rae, W. J. (1944). **Is the type of wheat fed a factor in "new wheat disease"?**—*Ibid.* 548–549. **1244**

I. Outbreaks of "pullet disease", occurring in 1940–43, in three different commercial laying flocks are described, in which the feeding of wheat appeared to be a contributory factor in the causation of the disease. A high rate of egg production (50% or above) seemed to be associated with the appearance of the disease.

Two experiments were carried out. In the first, four groups of 100 pullets each were fed on the same laying mash but with four different scratch feeds given *ad lib.* These four feeds were a new (1943) soft red winter wheat of local origin, a 1942 soft red winter wheat from the same farm, but consisting of several seed varieties, a soft red winter wheat of "Government" origin and a U.S. no. 2 yellow corn. In the hens receiving 1942 wheat and 1943 wheat, mortality and a precipitous drop in egg production occurred within 6–8 weeks of the commencement of wheat feeding, together with other clinical manifestations of "pullet disease". One case of "pullet disease" and two cases of nephritis which could perhaps also be attributed to "pullet disease", occurred in the other group receiving wheat, but there was no marked decline in production. Production in this group and in that receiving yellow corn was at a lower level than in the other two groups. There was no mortality or illness in the group receiving yellow corn.

In the second experiment, two different samples of wheat were fed to separate groups of pullets, 58% of which were in production. The wheats were fed for 12 weeks, but both groups remained perfectly normal. The experiment commenced in mid-October, a date somewhat late for the normal appearance of "pullet disease", although a number of cases had previously been encountered at this time of year and later.

Finally, these two samples of wheat and the two which appeared to have produced "pullet disease" were analysed for moisture content, fluorine, lead, barium, arsenic, zinc, copper and selenium, but no evidence was found that any of them could have accounted for the different effects obtained with the two pairs of wheat samples.

Q. concludes that, although the cause of pullet disease is unknown, these experiments confirm field observations that some wheats may be concerned in its incidence.

II. In a brief note, Q. now reports that in standard tests the germination percentage was higher in the samples which failed to produce the disease than in the other samples.

III. The authors used three groups of 25 cockerels 5–5½ months old. One group received a growing mash containing wheat, together with a scratch feed of old whole wheat. The second group received the same mash with a scratch feed of new wheat, whilst the third group had only whole wheat fed *ad lib.* Both wheats were a hard red spring variety. The new wheat was fed within 16 days of cutting and two days after thrashing. Throughout a four-week period, there was only one accidental death; otherwise, the birds of all three groups remained healthy. Cockerels were used in this experiment because new wheat had already been fed to pullets for some years on this farm without any bad results.—J. D. Blaxland.

Cowan, I. McT., & Fowle, C. D. (1944). **Visceral gout in a wild ruffed grouse.**—*J. Wildl. Mngmt.* **8.** 260–261. **1245**

The authors report a case of generalized visceral gout in an adult ruffed grouse (*Bonasa umbellus sabini*). They had not encountered this disease previously nor could they find any reference to its occurrence in other wild gallinaceous birds.—R. A. ROPER.

ATKINSON, L. N. (1944). **Hematological aids for diagnosis in the dog and cat.**—*N. Amer. Vet.* **25.** 675–679. **1246**

A. discusses his use of the differential and the total white cell counts in the differential diagnosis of bacterial and viral diseases. He notes the normal or low total counts with small left shifts in cases of canine and feline distemper, the low count in feline enteritis or leucopenia, and the high counts accompanied by a marked left shift in cases of pyometra and virulent bacteraemias. A very guarded prognosis should be given animals with low counts showing a marked left shift.

Use of the method is restricted by the time consumed, unless laboratory services are available, and little information is gained unless results are closely correlated with a thorough clinical examination.

The article is illustrated with typical case histories. —R. A. ROPER.

STRASSMANN, G. (1944). **Formation of hemosiderin in the lungs. An experimental study.**—*Arch. Path.* **38.** 76–81. [Author's summary copied *verbatim*.] **1247**

In normal circumstances most or all of the erythrocytes injected into the alveoli of a rabbit's lung disappear during the first twenty-four hours.

The disappearance of intra-alveolar erythrocytes is due in part or perhaps entirely to the activity of alveolar lining cells and in normal circumstances does not lead to the formation of hemosiderin in the lungs.

In the presence of a transitory pulmonary edema caused by combining the erythrocytes with a hypertonic solution of dextrose, their disappearance from the lungs may be delayed for as long as a week, and hemosiderin appears in the alveolar macrophages during the second day.

Hypertrophy and phagocytic activity of alveolar lining cells do not constitute an irreversible change so long as the cells retain their septal attachments. Attached alveolar lining cells containing hemosiderin may be reactivated and mobilized as long as two weeks after their original participation in the disposal of intra-alveolar blood.

TROWELL, O. A. (1944). **Liver function in health and disease.**—*Edinb. med. J.* **51.** 84–100. **1248**

This is a useful general account of the physiology of the liver, with special reference to recent work in this field. Sections dealing with liver function tests, the relation of dietary factors to liver disease, and the relation of the liver to the nervous system and to duodenal ulcers are included. For those wishing to obtain a clear and brief modern account of liver function, this Honyman Gillespie Lecture will be very valuable. There are no references.—E. G. WHITE.

DAVISON, W. F. (1944). **The practical aspects of infertility.**—*Vet. Rec.* **56.** 359–361. Discussion p. 361. **1249**

A clinical article dealing with methods of diagnosis and treatment of the various conditions causing infertility in dairy cattle. The author is of the opinion that suboestrus (silent heat) is the greatest single cause of physiological infertility amongst cows, whilst anoestrus is mostly confined to heifers. Other causes of infertility dealt with include diseases transmitted through coitus, cystic ovaries, and adhesions of the ovarian bursae. A short account is given of infertility in the bull.

—N. J. SCORGIE.

STARKE, N. C. (1943). **Examination of the sire for fertility.**—*J. S. Afr. vet. med. Ass.* **14.** 142–147. [Reprinted in *Vet. Rec.* **56.** 247–248. (1944)]. **1250**

The author stresses the necessity of always making an examination of the male when investigating sterility in domesticated animals. Examination of semen alone is insufficient for various reasons: sexual desire may be non-existent, there may be inability to copulate, and there may be inability to fertilize.

A table is given, summarizing some of the quantitative characteristics of semen from various animals. Methods of collecting semen from the different animals under field conditions are described. Spermatozoa must be examined for motility immediately after collection of semen or not later than after thirty minutes. The author's method of preparation of semen smears is described and he discusses the significance of the various abnormal forms of spermatozoa which may be encountered. A prognosis cannot be made on a single examination; the semen should be examined at intervals over a period of two to three months.

—E. M. ROBINSON (S. AFRICA).

I. LØJE, K. (1943). Impotentia coeundi hos Tyren som Folge af Erektionsinsufficiens. "Dysfunctio musculi retractores penis hos Tyren" s. **(Impotentia coeundi in bulls as a sequel to erectio insufficiens].** —*Maanedsskr. Dyrlaeger.* **55.** 217–232. **1251**

II. RASCH-NIELSEN, F. (1943). Impotentia coeundi hos Tyren. **[Impotentia coeundi in bulls].**—*Ibid.* 290–291. **1252**

I. By argument based on his observations on normal and affected animals, including some operated upon, L. demolishes the theory of GOETZE that there is a form of impotence in bulls due to dysfunction of the retractor penis muscle. According to Goetze's theory, copulation is inhibited by the prohibition of extension of the penis by the pull of the muscle. L. shows that there is continuous tension by the muscle during normal copulation, *i.e.* that full extension of the penis is effected by the force of erection against the pull of the retractor muscle. It is claimed by GOETZE and others that after myotomy or myectomy of the muscle, potency has been regained in a proportion of cases; L. suggests that in the young bulls (1½–2 years old) operated upon, the cure may have been due to normal physiological causes. It is suggested that hormone therapy would be more rational than myectomy. L. states that a better name for the condition is impotentia coeundi and not erectio insufficiens.

II. The author, while disagreeing with L., compliments him on his paper. He states that he was probably the first to carry out myotomy of the retractor penis in a bull (in 1919). At that time he ascribed the condition to an abnormally short retractor penis muscle and he still accepts this theory, although he gives no supporting facts.—J. E.

HELLER, C. G., NELSON, W. O., & ROTH, A. A. (1943). **Functional prepuberal castration in males.**—*J. clin. Endocrinol.* **3.** 573–588. **1253**

A new clinical syndrome associated with retardation or absence of sexual development in the human male is described. The syndrome, as observed by the authors in six cases, was characterized by the finding at biopsy that testes were completely atrophic or absent. Wolffian duct derivatives were, however, present in the scrotum. Other clinical findings included undeveloped genitalia; presence of erections but absence of ejaculation; eunuchoidal body proportions; lack of muscular development; and small prostate gland. The urinary excretion of follicle-stimulating and luteinizing hormones was markedly elevated; 17-ketosteroid excre-

tion was low, normal or depressed ; oestrogen excretion was less than normal. Substitutional therapy with testosterone propionate administered in 25 mg. amounts five times weekly caused sexual maturation analogous to that occurring spontaneously at puberty, whilst excretion of hormones in the urine tended toward normal levels.—N. J. Scorgie.

See also absts. **1365** (livestock diseases in the U.S.A., periodic ophthalmia, bovine liver abscess), **1363** (" six-day chick disease "), **1335** (degeneratve vascular diseases), **1336** (respiratory infections).

NUTRITIONAL AND METABOLIC DISORDERS

Gratzl, E. (1943). Hungerkrankheit (Erschöpfungsanämie) bei Schafen. [**Nutritional deficiency anaemia in sheep**].—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 161–167. **1254**

Outbreaks of anaemia in sheep were common in Western Germany in the spring of 1942, and were associated with a heavy mortality. In one flock of 350 animals over 100 died. The symptoms were debility, muscular atony, loss of wool, pallor of mucous membranes, and nasal discharge, with irregular respiration and heart action. The body temperature remained normal, and no cough was noticed. Whilst the number of erythrocytes was reduced to a quarter of the normal, the haemoglobin content of the corpuscles was not affected. Occasional erythroblasts, normoblasts, microcytes and macrocytes occurred, and there was low-grade poikilocytosis and sometimes severe anisocytosis, whilst marginal granules were present in the erythrocytes. Attempts to transmit the disease by the inoculation of blood, or extracts of ticks, were unsuccessful.

In one affected flock there was heavy infestation with intestinal helminths, lung worms and ticks, but in another flock there was no tick or abnormal helminth infestation.

It is concluded that the disease was due to malnutrition caused by prolonged stalling and bad feeding during the winter, followed by grazing on rough pastures in the early spring, and comparisons are made with " pine ", " bush sickness ", and " coast disease " but it is stated that the deficiency was in protein. It is stated that sheep are particularly affected by lack of protein, which they require for wool production.

—U. F. Richardson.

Endicott, K. M. (1944). **Similarity of the acid-fast pigment ceroid and oxidized unsaturated fat.**—*Arch. Path.* **37.** 49–53. **1255**

The subcutaneous injection into rats, of small amounts of unsaturated oils, such as cod liver oil or linseed oil, induced cysts at the site of injection. These cysts contained an orange-coloured lipoid material, which was acid fast and basophilic, being stained blue with Nile blue sulphate and black with osmic acid. Similar materials are formed on oxidation of emulsions of cod liver oil or linseed oil with potassium dichromate *in vitro*, and in human lungs following aspiration of cod liver oil. These lipoid pigments resemble ceroid, which is found in rats suffering from cirrhosis as a result of deficiency of choline. Choline, however, is not able to prevent the formation of the coloured lipoid when unsaturated oils are introduced into the lung, subcutaneous tissue, peritoneum or spleen.—E. Boyland.

Smith, E. G. (1943). **Changes produced in growth, reproduction, blood and urine of rats by ingestion and oral administration of cobalt salts.**—*Iowa St. Coll. J. Sci.* **18.** 87–88. [Thesis : only abst. given]. **1256**

Additions of 25 p.p.m. or less of Co to an adequate basal ration [details not given] caused no appreciable effect on the growth, reproduction and lactation of rats, but the addition of 50 p.p.m. caused a decrease in growth, in the size of litters and in lactation. With concentrations of 100 p.p.m. or more, reproduction ceased entirely ; when 500 p.p.m. were fed to young rats death occurred within 3–5 weeks, and higher concentrations were lethal in a shorter length of time.

Analyses showed that, in general, the tissues of control rats not fed Co salts contained less than 1 p.p.m. Co. In rats given Co, the liver and kidneys contained the greatest amounts, with lesser concentrations in the spleen, pancreas, heart, lungs and testes. Only in the liver was the concentration of deposited Co proportional to the amount of Co fed.

10 p.p.m. Co (as cobalt nitrate) in the diet appeared to be the lowest concentration that would stimulate haemoglobin formation ; this stimulation decreased to the level of the controls after about 14 weeks.

The minimum lethal dose of cobalt nitrate and cobalt chloride solutions when given by stomach tube was found to be approximately 20 mg. Co per 100 g. body weight.

The effects of Co salts given by stomach tube on blood sugar levels are also reported.—R. Allcroft.

Jungherr, E., Gifford, R., & Lamson, A. L. (1944). **Inapparent muscular dystrophy in young ring-necked pheasants.**—*J. Wildl. Mngmt.* **8.** 261–262. **1257**

Muscular dystrophy was present in 18 clinically normal ring-necked pheasants (*Phasianus colchicus torquatus*) out of 49 examined. The birds were from 14 breeders ; they had been fed different proprietary foods and varied in age from 8–18 weeks.

Striated whitish lesions were noted in the breast and superficial flexor muscles in which there was a Zenker's type of degeneration. No other associated lesions could be found. Incidence could not be related to sex, but the younger specimens were the more commonly affected.

The lesions were suggestive of those described in ducklings and laboratory animals as due to a Vitamin E deficiency.—R. A. Roper.

Rasmussen, R. A., Stafseth, H. J., Freeman, V. A., & Miller, M. J. (1944). **Influence of B vitamins, liver and yeast on induced necrotic enteritis in swine.**—*Vet. Med.* **39.** 421–423. **1258**

The authors describe experiments carried out to determine if differing nutritional regimens influence the course of necrotic enteritis induced in swine by feeding broth cultures of *Salmonella cholerae-suis*.

Between November 1942 and February 1944, three trials were carried out, involving a total of 113 pigs. These were arranged in 17 groups, each group having six or seven animals. All groups were slop-fed on the same basal ration, except that one group received an addition of 2% liver (dry basis) and another, 5% brewer's yeast. All animals made normal gains in the pre-experiment period. In the first trial the supplemental ration consisted of nicotinic acid, at levels of 15, 100, and 300 mg. per 100 lb. live weight. The groups getting 300 mg. and 100 mg. plus liver, respectively, made the best live weight gains in the recovery phase. Animals receiving 100 mg. nicotinic acid plus liver made better live weight gains in the recovery phase than animals receiving 100 mg. nicotinic acid alone.

The second and third trials were inconclusive.

The authors conclude that there is some principle or principles in liver, but not in yeast, which aids recovery from necrotic enteritis. Nicotinic acid appears to aid recovery from this condition but they believe a composite of B vitamins may be more beneficial in

promoting live weight gain following the disease. It was found that the administration of broth culture of *S. cholerae-suis* in the form of a drench was less harmful than administration in the food.—D. A. MacPherson.

Lardinois, C. C., Mills, R. C., Elvehjem, C. A., & Hart, E. B. (1944). **Rumen synthesis of the vitamin B complex as influenced by ration composition.**—*J. Dairy Sci.* **27.** 579–583. **1259**

Urea as a source of nitrogen for cattle definitely increased the synthesis of riboflavin, nicotinic acid, biotin, and pantothenic acid, provided that molasses or a readily fermentable carbohydrate was supplied with the ration. The synthesis of pyridoxine and "folic acid" could not always be correlated with the variation in ration composition, but if the ration contained timothy hay and a fermentable carbohydrate, the addition of urea definitely increased the synthesis of pyridoxine. In the absence of a readily fermentable carbohydrate and probably with a low population of micro-organisms, the synthesis of the members of the vitamin B complex is not at a maximum. Data indicate that, if vitamin B_1 is synthesized in the rumen, it may be absorbed or destroyed more rapidly than it is synthesized.—G. D. S.

Mitchell, H. K., & Isbell, E. R. (1942). **Intestinal bacterial synthesis as a source of B vitamins for the rat.**—*Univ. Tex. Publ.* No. 4237. pp. 125–134. **1260**

Experiments were carried out on rats to determine whether intestinal bacteria act as a source of the B vitamins and whether the types and numbers of intestinal bacteria, modified by the diet fed to the rat, play an important part in the contribution of vitamins by the flora. Results indicate that the body tissues absorb various B vitamins synthesized by the intestinal flora of the rat's caecum. Based on determinations of the pantothenic acid and pyridoxine balances respectively, it was shown that bacterial flora contribute the following approximate percentages of the dietary intake of B vitamins: thiamine 8 and 18%; riboflavin 5 and 19%; nicotinic acid 3·5 and 1·5%; pantothenic acid 58 and 11%; pyridoxine 130 and 230%; biotin 430 and 230%; inositol 0·1 and 0·08%; and folic acid 71 and 67%. The extent of the vitamin contributions by the bacteria is considerably influenced by the type of flora, which, in turn, may be modified considerably by small changes in the diet. Both the quality and quantity of the intestinal flora are important.—A. Eden.

Taylor, A., Pennington, D., & Thacker, J. (1942). **The vitamin requirements of cecectomized rats.**—*Univ. Tex. Publ.* No. 4237. pp. 135–144. **1261**

Studies made of the sizes of the caecum in rats of different ages showed that this organ with its contents comprises 1% of the total digestive tract in very young rats, increasing with advancing age until at maturity it averages more than 30% of the total tract.

Removal of the caecum from rats fed an adequate diet did not appear to affect them unduly compared with normal rats, and both caecectomized and normal rats reacted similarly to a pyridoxine-deficient ration, suggesting that the caecal contribution of this vitamin was negligible or absent. On a ration diluted with sucrose and deficient in several of the B vitamins, caecectomized rats suffered badly in comparison with normal animals which remained in good health. From this it would appear that the caecum makes a material contribution to the rat's supply of several of the B vitamins when the diet is adequate to support the most suitable caecal flora, and the suggestion is advanced that better controlled studies in B avitaminoses would be obtained by the use of rats from which the caeca had been removed.—A. Eden.

Madsen, D. E., & Nielsen, H. M. (1944). **The production of parturient hemoglobinemia by low phosphorus intake.**—*J. Amer. vet. med. Ass.* **105.** 22–23. **1262**

Parturient haemoglobinaemia, with characteristic symptoms, was produced in a high-yielding dairy cow in good nutritional condition by feeding a ration consisting of dried beet pulp and green alfalfa hay. This ration was low in phosphorus but adequate in other respects. The experiment began nine months after calving, and continued for two and a half years, during which time three normal, healthy calves were born. Symptoms of aphosphorosis occurred during the last 18 months. Inorganic plasma phosphorus showed the seasonal lactation curve characteristic of high milk producers. The lowest value (1·43 mg. per 100 ml.) was reached when the symptoms were most pronounced, and this was associated with a marked drop in the erythrocyte count. Administration of bone meal raised the phosphorus to 3 mg. per 100 ml. and this level was maintained when the experimental ration was replaced by a grain mixture and the cow placed on pasture.

—E. M. Cruickshank.

—. (1944). **Discussion on the limitations and uses of the comparative method in medicine. III. Nutrition and endocrinology.** [Speakers: Green, H. H., Folley, S. J., Hammond, J., Walton, A., Worden, A. N., Phillipson, A. T., Brooksby, J. B., Worrall, R. L., & Wooldridge, W. R.]—*Proc. R. Soc. Med.* **37.** 441–448. **1263**

Green dealt with diseases in animals which, while appearing to be of nutritional origin, were in reality the result of endocrine dysfunction.

In "grass tetany" (bovine hypomagnesaemia), which occurs in grazing animals, there is a marked fall in plasma Mg. If this fall is gradual clinical symptoms may not develop, but if the plasma Mg drops suddenly, acute hypomagnesaemia tetany may occur—ending in fatal convulsions. The disease is not correlated with variations in the dietary intake of Mg, but arises from the temporary dysfunction of an endocrine mechanism which controls the level of plasma Mg. In "milk fever" of cows and lambing sickness of ewes, the blood Ca may fall to half the normal level soon after parturition. This fall is not associated with low Ca intake, but is believed to be due to the temporary dysfunction of the parathyroids. Pregnancy toxaemia of ewes and post-parturient hypoglycaemic acetonaemia of cows are likewise due to an imbalance of the endocrine secretions, malnutrition being only a precipitating factor.

Folley dealt with the advantages of the comparative method of investigation and outlined its limitations. The advantages mentioned were (1) that radical operative procedures, leading to valuable advances in physiological knowledge could be undertaken, (2) the economy of material, since small animals could be used, (3) the economy of time, since laboratory animals have a much shorter life cycle than man, and (4) that individual variation in response to treatment could be greatly diminished by using inbred strains of animals. The main limitations of the method result from species differences and psychological factors. Striking differences exist between species in, for example, the hormone content of the pituitary, and in the occurrence of gonadotropins in body fluids. Psychological factors play a far more important part in man than in animals, and hence great caution is needed in applying to human beings the results of experiments involving these factors.

Hammond considered the comparative method extremely useful, provided the physiology of the species concerned was fully understood.

WALTON stated that the comparative method was often the only approach to problems which affect man. The clinical tests now applied for male fertility are based on results of animal experimentation, as also is our knowledge of the endocrinology of spermatogenesis and ovum production.

WORDEN referred to the vitamins of the B complex, which provided many examples of the uses and limitations of the comparative method. Investigations now in progress on calves might have an application to infant nutrition.

PHILLIPSON showed that the importance of comparative work is well illustrated by the study of digestion, pointing out that though the same agents may exist in all domestic species the relative importance of these agents differs considerably.

BROOKSBY stated that the endocrine function of the placenta could not be ascertained without experiments on animals.

WORRALL, in referring to the problem of diarrhoea and vomiting of infants, said that a final solution was awaited from those who could adapt the comparative method to the investigation of this disease.

WOOLDRIDGE said that the comparative method enabled an investigator to piece together the results of experiments, not necessarily on the same species, on distinct but related problems, and obtain a comprehensive picture of the complex dynamic equilibria of a living system.—E. M. CRUICKSHANK.

See also absts. **1240** (diet and tympanites), **1269** (diet and blood P of ewes), **1222** (effect of worms on lamb nutrition), **1365** (necrotic enteritis in pigs vit. A deficiency in cattle), **1148, 1149** (TB. and vit. C), **1363** (nutritional encephalomalacia in chicks), **1242-1244** (effect of wheat on "blue comb disease"), **1337** ("milk fever").

PHYSIOLOGY, ANATOMY AND BIOCHEMISTRY

*STAFFE, A. (1941). Die Frage der Anpassung unserer Haustiere an die afrikanischen Tropen. [**Adaptation of European livestock to the African tropics**].—*Z. Tierzücht. Zuchtbiol.* **49.** 217–251. [Abst. from abst. in *Jber. Vet.-Med.* **69.** 403]. **1264**

It is pointed out that all stock in Africa were domesticated outside that continent, and were imported by the early settlers, becoming acclimatized to Africa by a process of selection accompanied by exceptionally heavy losses. In the early days of colonial expansion, European stock was brought to Africa by the Portuguese and Dutch, but this importation had little lasting effect and, in fact, all attempts to introduce European stock have had practically negative results. S. attempts to explain this failure and to indicate the lines of correct planning for the improvement of animal husbandry in tropical Africa, dividing the area into zones of rain forest, savanna, thornbush plains, desert, and highlands which each present their own peculiar problems. He discusses in detail the influence of temperature, humidity, the action of light rays, and mineral and vitamin deficiencies. Particular attention is drawn to the influence of climate on the skin and hair, and the changes in skin structure, pigment, and the thickness of the hair covering are discussed. Attention is also drawn to the different methods of management and feeding, and the peculiar digestive powers developed by African stock in response to a mineral-deficient diet. The influence of age, sex, and country of origin on the chances of survival of stock are not thoroughly understood. The conclusion is reached that the establishment of improved and productive stock is an urgent necessity, and that improvement by selection from indigenous stock should give the surest results. —U. F. RICHARDSON.

RIEMERSCHMID, G. (1943). **The amount of solar radiation and its absorption on the hairy coat of cattle under South African and European conditions.** —*J. S. Afr. vet. med. Ass.* **14.** 121–141. **1265**

This article is divided into two parts, one dealing with the intensity of solar radiation and the other with the amount of radiation affecting cattle. In part I, is shown the extent to which radiation in summer exceeds that in winter. Figures are given to show that the amount of radiation at inland stations in South Africa, in the Alpine region of Switzerland and the lowlands of central Europe is very high in the three summer months and, contrary to popular belief, is very similar. In winter, however, the radiation in South Africa is much greater. Features affecting radiation are cloudiness, the length of the days and the angle of incidence of the sun's rays.

In part II the total amount of sun and sky radiation and the radiation reflected from the ground are correlated with the surface area of cattle. In measuring the amount of radiation on brown and white hides a great difference was found; this was due to the pigmentation, the absorption on the brown hide being 80% of the incoming radiation whereas with the white hide it was only 50%.

Brown cattle absorb approximately three times as much heat from radiation as they produce by metabolism during an equal period. It is shown that by providing shade the amount of radiation influencing cattle can be reduced by 60–70% of the amount which impinges on the animal in the open veldt. Readings were taken for ten cloudless days in shade and sunlight.

—E. M. ROBINSON (S. AFRICA).

BONSMA, J. C., & PRETORIUS, A. J. (1943). **Influence of colour and coat cover on adaptability of cattle.**—*Fmg S. Afr.* **18.** 101–120. **1266**

The chief points of interest which arise in this article are that light-coloured cattle are better adapted to tropical and subtropical climates than are dark-coloured ones and that smooth-coated animals should be used more for breeding in tropical areas, since the solar radiation which is not reflected is absorbed by the skin, and interferes with the ability of the animal to get rid of excessive heat.—E. M. ROBINSON (S. AFRICA).

MITSCHERLICH, E. (1943). Die Tränkwasserverdorgung der Haustiere in den warmen Ländern. [**Provision of drinking water for domesticated animals in hot countries**].—*Dtsch. tropenmed. Z.* **47.** 215–226. **1267**

The opening up of water supplies is an important problem throughout arid warm areas. Great stretches of fertile land in Africa and Australia are unusable in the absence of drinking water for stock. With only a few watering places, breaking up the herds into small groups for selective breeding becomes difficult, and a rotation of pasture, which may be important in the control of helminth and tick infestations, becomes impossible. [The ability to disperse stock in arid areas would also have an important influence on soil conservation.]

The conservation of surface water by the tank system as adopted in Morocco, or in collecting basins as used in South Africa and Australia, is described. The importance of piping the water off into troughs, to prevent contamination, is emphasized. The construction of dams, the control of outgoing water, and the importance of maintaining the collecting area free from sources of contamination such as diseased animals

or carcasses are also discussed. There is reference to mosquito control by the use of fish. The precautions to be taken in the use of springs, and the methods of developing the capacity of underground streams are described. The relative advantages of pipe and shaft wells, and the chemical purification of water are discussed. [The article is interesting, but contains no new information.]—U. F. RICHARDSON.

CUTHBERTSON, D. P. (1944). **Protein metabolism.**—*Brit. med. Bull.* **2.** 207–217. [Author's conclusion slightly amended.] **1268**

Some of the main features have been sketched of protein metabolism, which in itself is but one episode in cellular activity; not only is there change of material but there is change of energy. Although a little is known of the great activity of the organ proteins and of their continuous regeneration from the amino-acids of the fluids that bathe them, practically nothing is known about the regulation of this continuous chemical activity, which is so adjusted that there is normally no final quantitative or qualitative change in the composition of the tissues other than those appropriate to the stage of growth and sex of the organism. Here lies a practically limitless field of discovery.

In the past, pathology has been largely a study of morbid anatomy and protein has been considered only in so far as it was the main material which took up dyes and so provided a picture of the histological structure. The pathologist is now tending to become a morbid physiologist and protein is no longer for him solely a clue to cellular configuration but is now an integral part of function, and his study concerns the regulation of those chemical processes which lead to deformation and dysfunction. A somewhat similar transformation is taking place in the field of medicine and surgery. Evidence of this is particularly to be seen in the new approach to the study of diseases of the liver and the reaction to trauma.

BEESON, W. M., TERRILL, C. E., & BOLIN, D. W. (1944). **Some factors affecting the blood phosphorus level of range ewes.**—*J. Anim. Sci.* **3.** 175–182. **1269**

Blood was collected from about 40 Columbia ewes at different times of the year over a period of four years, and the plasma was analysed for inorganic P. Seasonal trends in the levels were pronounced, with significant variation between seasons. Highest values occurred in sheep on winter and spring pastures, with lowest levels at lambing time, in late summer and autumn, and in sheep in the winter feedlot. The low values during parts of the winter and on typically winter keep were significantly raised by supplementary feeding with oats or cottonseed cake.

Blood P was also lower for ewes which had recently lambed than for those about to lamb; it was higher in barren ewes than in those that were pregnant or were suckling lambs, and higher in ewes with single lambs than in those which had twins. Ewes which were losing weight tended to have higher blood P levels, which incidentally also appear to decrease with age. No definite evidence of any condition of aphosphorosis was encountered although low blood P levels, down to 2·3 mg. % were found in odd cases. The percentage of ewes with values below 3·5 mg. % was greatest at lambing, and lowest at times when supplementary feeding was being given.—A. EDEN.

MCANALLY, R. A., & PHILLIPSON, A. T. (1944). **Digestion in the ruminant.**—*Biol. Rev.* **19.** 41–54. **1270**

As far as digestion in the rumen is concerned, the carbohydrates, and in particular cellulose, provide the most interesting groups of foodstuffs. Their digestion is accomplished principally with the aid of bacteria, although the protozoa present may play some part as yet unknown. Herbivorous animals have two main methods of dealing with bulky foods; the development and evolution of the stomach as in ruminants, and the enlargement of the caecum as in the horse and rabbit. Mechanical aspects of rumen digestion are discussed. Food passing into the rumen and reticulum is kept in motion by rhythmic contractions; regurgitation is effected by an inspiratory effort with a closed glottis, and after regurgitation the bolus is returned to the fermentation chamber until it is sufficiently comminuted to continue its journey through the tract. The efficacy of this process of digestion is determined largely by the length of time the food spends in the rumen; passage of the ingesta from this organ is slow, being spread out over a period of several days. The temperature of the rumen remains tolerably constant, whilst the pH falls for several hours after food is given and then rises to the pH of the saliva; it usually lies between six and seven. The vast volume of saliva secreted (as much as 13 gallons in 24 hours), with its effective buffer system of salts, is the controlling factor for the pH, and hence maintains the optimum conditions for the activity of the bacteria. Conditions inside the rumen are almost anaerobic.

The breakdown of cellulose and other carbohydrates is accomplished by the bacteria of the rumen, although plant enzymes may play a minor role, with carbon dioxide, methane, and soluble fatty acids as the principal products. There is some suggestion of the synthesis of polysaccharides. The extent to which cellulose is digested is affected by the other constituents of the diet. Various methods have been used for determining the rate and degree of digestion and it appears that considerable digestion of the cellulose occurs within the first 14 hours. More recent studies have conclusively proved that the absorption of volatile fatty acids takes place from the rumen and reticulum, and there is evidence also for the direct absorption of glucose and various drugs. The volatile acids are principally acetic, with smaller amounts of butyric and propionic acids. Fermentation also takes place to a lesser extent in the caecum of the ruminant, with the production of volatile fatty acids probably derived from cellulose.

—A. EDEN.

QUIN, J. I. (1943). **Studies on the alimentary tract of merino sheep in South Africa. VII.—Fermentation in the forestomachs of sheep.**—*Onderstepoort J. vet. Sci.* **18.** 91–112. [For part V, see *V.B.* **10.** 967]. **1271**

Experiments were carried out on merino sheep with permanent ruminal fistulae. A method was devised whereby small portions of freshly drawn ruminal ingesta were fermented *in vitro* and the gas yields determined. It was found that variable proportions of such sugars as glucose, fructose and sucrose are rapidly oxidized through the agency of a strain of the false yeast *Schizosaccharomyces ovis* which is present in large numbers in the rumen of sheep, especially those on a lucerne diet, large volumes of gas being suddenly generated in the ruminal mass. This yeast is suppressed or totally eliminated by starvation of the animal. Under these conditions iodophilic bacteria in the ingesta are afforded the opportunity of metabolizing the available sugar. Starch is synthesized instead of glycogen, as occurs with the yeast cells. The author considers that while this extensive synthesis of glycogen and other polysaccharides forms an integral part in the carbohydrate metabolism, its full significance is not understood; he stresses the necessity for further investigation.—E. M. R.(S. AFRICA).

BARCROFT, J., MCANALLY, R. A., & PHILLIPSON, A. T. (1944). **Absorption of volatile acids from the**

alimentary tract of the sheep and other animals.—*J. exp. Biol.* **20.** 120–129. **1272**

By the use of suitable techniques the authors were able to secure blood samples from vessels draining various parts of the alimentary tract of the sheep, horse, pig and rabbit. The concentration of volatile fatty acids in the blood draining the rumen was considerably higher than that of the peripheral blood in which the amount of volatile acid was either very small or absent. There were appreciable amounts of volatile fatty acids in the blood from the reticulum, omasum and caecum, but negligible amounts in the blood from the abomasum and small intestine of the sheep; significant quantities were present in the blood draining either the caecum or colon of the horse, pig and rabbit.

By methods of successive distillation it was shown that acetic acid is the predominant volatile acid of both the ruminal contents and the blood of the ruminal vein, although the proportion of acids of higher molecular weight is greater in the rumen than in the corresponding blood. The same statement appears to hold true for the caecum of the sheep and the large intestine of the horse and pig.

It was found that the introduction of the acetate, propionate and butyrate of sodium into the rumen led to the absorption of the corresponding acids as measured by the concentration of volatile acid in the blood draining the rumen, at rates inversely proportional to their molecular weights, acetate being most and butyrate least rapidly absorbed.

Varying estimates were made of the rate of absorption of volatile acid, reckoned as acetic acid, from the rumen and reticulum together, ranging from 1–5 g. per hour, but reasons are given for believing these values to be minimal. Even on this conservative basis it is shown that at least one-sixth of the total daily carbon requirements of the animal can be met by the volatile acids produced in the rumen. The need for further investigation of the nutritional roles of these acids is indicated. —A. Eden.

Barcroft, J., McAnally, R. A., & Phillipson, A. T. (1944). **The absorption of sodium ortho-iodohippurate from the rumen of lambs.**—*J. exp. Biol.* **20.** 132–134. **1273**

Experiments were carried out in which the rumen, reticulum and omasum had been isolated from the rest of the alimentary tract of lambs, which were then dosed *per os* with sodium *o*-iodo-hippurate, a drug opaque to X-rays. The absorption of the drug from the rumen was conclusively demonstrated by a series of plates, taken at definite intervals after dosing, which showed the presence of the drug in the bladder; this was confirmed by subsequent chemical analysis.

The histology of the epithelium of the rumen is described as differing from that of the skin in (1) the thinner layer of cornified cells, (2) the discontinuous nature of the layer of granular cells (stratum granulosum) and (3) the absence of sebaceous glands.—A. Eden.

Neves e Castro, A. V. (1941). Diagnose de la grossesse de la jument. [**Pregnancy diagnosis in the mare**].—*Rev. Med. vet., Lisboa.* **36.** 101–105. [In French]. **1274**

Cuboni's test was tried in 118 cases, and was found to be useful and accurate. Subsequently modifications were introduced which increased its accuracy, ease of execution, and speed. (1) Unfiltered urine with and without its sediment, was tried against filtered urine as hitherto used; the results showed the lengthy filtration process to be quite unnecessary. (2) Hydrolysis was effected by the addition of 5 ml. concentrated sulphuric acid in the cold, to 15 ml. of urine, instead of by heating the urine with hydrochloric acid over a water-bath. After mixing and rapid cooling in a separating funnel, 20 ml. benzene were added and after shaking 50 times with the acidified urine, were run off and extracted with a further 10 ml. sulphuric acid. The latter was then heated for 5 min. at 80°C. Finally, on rapid cooling and shaking, the colour reaction developed. It is claimed that the reaction was more pronounced by this method, and that a proportion of true positives was obtained in mares three and a half months pregnant, which were still negative reactors by the usual technique.—F. L. M. Dawson.

Chang, M. C. (1943). **Disintegration of epidymal spermatozoa by application of ice to the scrotal testis.**—*J. exp. Biol.* **20.** 16–22. **1275**

Testes of rabbits were cooled with ice applied to the scrotum for ten minutes. Disintegrated spermatozoa (24–95%) appeared in the ejaculate 24 hours after treatment, and their occurrence lasted up to about ten days, depending on the rate of evacuation of the disintegrated sperms from the cauda epididymis. The ice treatment of the testes had no adverse effect on sex drive, nor on spermatogenesis. In a further series of experiments with rabbits, rats and g. pigs, the testes were treated with ice for 10–20 minutes. About 20–30% of disintegrated sperms were found in the cauda epididymis of rabbits and rats but not in g. pigs; the negative results in the case of the g. pig are probably due to the anatomical features of the scrotum and of the testis and cauda epididymis in this species.—N. J. Scorgie.

I. Gatenby, J. B., & Collery, L. (1943). **The function of the mammalian epididymis.**—*Proc. R. Irish Acad.* **49.** 103–108. **1276**

II. Collery, L. (1944). **Note on the physiology of the mammalian epididymis and spermatozoon.**—*Ibid.* 213–223. **1277**

I. The authors produce evidence to show that the epididymal cells secrete a granular material which becomes intimately mixed with the spermatozoa. They postulate that this granular material becomes affixed to the middle piece of the sperm and becomes the structure known as the middle piece bead. [Most previous workers on this subject have assumed that the middle piece bead represents a remnant of the cytoplasm which is extruded by the spermatid during metamorphosis.]

II. This paper is a record of cytological observations made on the semen and epididymis of the dog and g. pig. In the epididymal sperm of these two species, and indeed in the epididymal sperm of all the Mammalia, a middle piece bead exists, which is distinct from the much smaller neck bead. The observations recorded in this paper confirm that the middle piece bead first appears just behind the head of the sperm, and that with the passage of the sperm through the epididymal canal the bead tends to migrate to its definitive position at the junction of the middle piece and tail, at which site it may be seen in the ejaculated sperm of the dog. The authors discuss possible functions of the middle piece bead but reach no definite conclusion. It seems clear, however, that whilst sperms are probably motile from the time they leave the seminiferous tubules, active forward movement is not seen until the bead has reached the junction of the middle piece and tail. There is evidence that in some species the ultimate behaviour is different from that seen in the dog. A limited number of observations by the authors on the semen of bulls have indicated that in this animal loss of the bead may occur either before or soon after ejaculation, and that the sperms are not fully mature until this has occurred. This fact was also postulated by Lagerlöf [*V. B.* **4.** 780] on clinical

grounds based on the results of extensive observations on fertile and infertile bulls.—N. J. Scorgie.

Comstock, R. E., Green, W. W., Winters, L. M., & Nordskog, A. W. (1943). **Studies of semen and semen production.**—*Tech. Bull. Minn. agric. Exp. Sta.* No. 162. pp. 55. **1278**

This bulletin is largely a review of the existing methods for the evaluation of semen, to which the authors have made a number of original contributions. Experiments here recorded indicate that estimation of semen density from light transmission measurements made with a photo-electric colorimeter is faster and more accurate than that made with a haemocytometer. They also show that estimation of density by comparison with opacity standards, is sufficiently accurate to be valuable for field use.

The main work of the authors on the evaluation of sperm cell quality has been concerned with (a) the relationships of sperm viability to rates of glycolysis and respiration, and (b) sperm cytology with emphasis on a specific structural detail of the sperm (vesicle structure). A number of studies dealing with the glycolysis and respiration of sperm have already been published elsewhere; additional data now reported indicate that glycolysis and respiration rates are equally useful measures of the viability of ram sperm.

Evidence is presented that the vesicle structure on the sperm head, already described by Green [*V. B.* **10.** 881] may be an important attribute of high-quality sperm even though its presence is not closely correlated with viability. The vesicle structure was not found on sperm with abnormally formed heads, but it appeared with equal frequency on sperm with tail abnormalities, and entirely normal sperm.

The correlations among the various characteristics of semen studied were so low that each required separate determination for accuracy. Further, the variations from one sample of semen to another from the same animal within a period of a month, were so great that several samples had to be tested, to estimate accurately the fertility of a particular animal. Data on semen which did or did not induce conception, when used to inseminate ewes, failed to furnish strong evidence on the actual or relative value of the characteristics concerned for the evaluation of semen quality. The glycolysis rate showed the highest correlation with the occurrence of conception; the proportion of normal cells to abnormal ones, the least.

A new apparatus for measuring the respiration rate of sperm cells is described as suitable for field use. It is portable, moderate in cost, and the accuracy attained with it is reasonably close to that of the Warburg apparatus.

Experimental data are presented on the seasonal trends of the various characteristics of the semen of Shropshire rams. Quality was lower on the average in the summer and early autumn. Semen quality during at least the early part of the breeding season, was reduced in rams in excessively high condition or long fleece through the summer months.—N. J. Scorgie.

Knoop, C. E., & Pounden, W. D. (1943). **Artificial insemination of dairy cattle.**—*Bull. Ohio agric. Exp. Sta.* No. 641. pp. 16. **1279**

This bulletin gives a description of the usual techniques involved in the artificial breeding of cattle. Constructional details are illustrated for a mechanical or dummy collecting "cow". It has been found by the authors that egg-yolk-gelatin buffer diluent of Knoop (1941) maintains a higher degree of sperm motility longer than the egg-yolk buffer diluent of Phillips and Larfy.—N. J. Scorgie.

Hartman, C. G. (1944). **Some new observations on the vaginal smear of the rat.**—*Yale J. Biol. Med.* **17.** 99–112. [Author's summary copied *verbatim*]. **1280**

Shorr's modification of Papanicolaou's tri-chrome technic for staining vaginal smears has been applied to a study of the vaginal cycle of the rat and the results are briefly presented in this preliminary report. New cell types, recognizable by the aid of the new technic, are listed. The method aids in analyzing subtle changes in the vaginal smear of so-called "constant estrus" individuals. Some fundamental problems are raised as a result of these studies.

Pfeiffer, C. A., & Hooker, C. W. (1944). **Responses of the stromal nuclei of the macaque endometrium to estrogen and progesterone.**—*Yale J. Biol. Med.* **17.** 249–258. [Authors' summary copied *verbatim*]. **1281**

The nuclei of the stromal cells of the endometrium of the ovariectomized monkey were found to be small and spherical. Their chromatin was present as evenly scattered, large blocks; nucleoli were rare. No change in these nuclei was produced by the administration of five daily injections of 0·5 and 3·0 mg. of progesterone. Ten daily injections of 150 rat units of estradiol benzoate resulted in conspicuous hypertrophy of the stromal nuclei; the chromatin particles became quite small and a distinct nucleolus appeared in each nucleus. The simultaneous administration of estradiol benzoate and progesterone also caused nuclear hypertrophy. Here nucleoli were present and the chromatin particles were large. The substitution of progesterone for five days after ten daily injections of estrogen resulted in retention of the estrogen-progesterone type of stromal nucleus but in a diminution in nuclear size. The stromal nuclei of the endometria of monkeys whose ovaries contained medium-sized or large follicles were like those of estrogen-treated castrates. When a functional corpus luteum was present the stromal nuclei were like those of castrates given estrogen and progesterone simultaneously.

The changes in the stromal nuclei of the endometrium are sufficiently distinctive and uniform to permit recognition of endometrial type by their use alone. The humoral basis of the changes in these nuclei is unlike that in the mouse, and may be related to differences in the endocrine background of pregnancy in the two species.

van Wagenen, G., & Morse, A. H. (1944). **Estrogen tolerance in pregnancy.**—*Yale J. Biol. Med.* **17.** 301–309. [Authors' summary copied *verbatim*]. **1282**

Thirty-five pregnant monkeys received estrogens in varying daily amounts up to 250 mg. with the highest total dosage 1 gram. There were only five exceptions to normal length of pregnancy associated in three instances with defective development of the fetus. In no case was abortion initiated by the administration of hormone nor could it be associated with the withdrawal of the hormone following a series of injections.

Engle, E. T. (1944). **The effect of hypothyroidism on menstruation in adult rhesus monkeys.**—*Yale J. Biol. Med.* **17.** 59–66. [Author's summary copied *verbatim*]. **1283**

Two definite tendencies are shown in these experiments. Amenorrhea occurs in hypothyroid monkeys with intact ovaries. Normal cyclic menstruation can be induced by giving thyroid, a single period of treatment resulting in two or three relatively normal cycles.

In ovariectomized hypothyroid animals treated with a uniform dosage of estrogen, bleeding may not occur at all or after a greatly prolonged interval. After

estrogen and thyroid treatment, the interval of bleeding after withdrawal of estrogen is within the range of that occurring in the non-thyroidectomized monkey.

There is little variation in the degree of duration of bleeding in hypothyroidism, but menorrhagia is more frequent in hypothyroid monkeys.

FOLLEY, S. J., & COWIE, A. T. (1944). **Adrenalectomy and replacement therapy in lactating rats.**—*Yale J. Biol. Med.* **17.** 67–74. [Authors' summary copied *verbatim*]. **1284**

Adrenalectomy in the rat on the 4th day of lactation caused a marked, but not complete, inhibition of lactation. Lactation was partially maintained in adrenalectomized rats by daily injections of 1 mg. of desoxycorticosterone acetate; 17-hydroxy-11-dehydrocorticosterone (1 mg. daily) was slightly less effective. Smaller responses were given by daily injections of 0·1 mg. desoxycorticosterone acetate and of 2 ml. or 1 ml. of an adrenal cortex extract. Deleterious effects on the lactational performance of adrenalectomized rats were exerted by 11-dehydrocorticosterone (1 mg. daily), adrenal cortex extract (0·5 ml. in divided doses daily) and, most dramatically, by diethylstilbestrol (0·1 mg. daily). Adrenalectomized rats are more sensitive than are intact rats to the lactation-inhibiting action of estrogens.

SCHULTZE, A. B., & TURNER, C. W. (1944). **The rate of thyroxine secretion by the thyroid glands of White Leghorn cockerels.**—*Yale J. Biol. Med.* **17.** 269–280. [Authors' summary copied *verbatim*.] **1285**

Determination of the number of micrograms of d,l-thyroxine necessary to restore the thiouracil-induced enlargements of the thyroids of White Leghorn cockerels to normal size for groups varying from two weeks of age to 12 weeks of age was made.

For the 2-week-old group 1·95 micrograms per chick daily were required; for the 4-week-old group 3·83 micrograms; for the 6-week-old group 7·55 micrograms; for the 7-week-old group 11·35 micrograms; for the 9-week-old group 14·4 micrograms; for the 12-week-old group 16·5 micrograms. These amounts are assumed to approximate the rate of thyroxine secretion in groups of these ages in terms of d,l-thyroxine. Over the time interval in which these determinations were made and under the conditions of the experiment, there was a decreasing rate of thyroxine secretion per 100 grams of body weight. This relationship can be expressed by the equation Y (d,l-thyroxine) $= 0{\cdot}055\ X^{0{\cdot}85}$ (body weight, with increasing age from 2 weeks to 12 weeks).

It was generally apparent that the chicks receiving 0·1 per cent of thiouracil in their feed for two weeks showed more body fat than other chicks on the same ration but receiving no thiouracil. This seems to indicate that the inhibition of thyroxine secretion for two weeks by thiouracil accelerates the fattening process.

HENSHAW, P. S., & MEYER, H. L. (1944). **Measurement of epithelial growth in surgical wounds of the rabbit's ear.**—*J. nat. Cancer Inst.* **4.** 351–358. **1286**

The healing of experimental epithelial wounds of the rabbit's ear was studied and the various methods used for measuring the rate of healing were compared. It was found that the measurement of the width of the exposed area of regular shaped wounds was the most useful. It was as good as the method using planimeter measurements made from photographs and was much less tedious. With irregular wounds the diameter of the largest circle which could be inscribed within the exposed area was taken as the width. Healing occurred in three phases: a lag phase of little or no healing lasting 3–5 days, an active growth phase, the duration of which depended on the size of the wound and a phase of reduced growth near the end of the healing process.—E. G. WHITE.

STEDMAN, E. (1944). **The chemistry of cell nuclei.**—*Edinb. med. J.* **51.** 353–366. **1287**

An account of the structure and physiology of the nucleus in terms of its chemical composition. The aspects dealt with include the general properties of the nuclear components, and the methods used in studying the chemistry of cell nuclei, with particular reference to the isolation of chromosomin from fish sperm.

All nuclei so far examined consist essentially, apart from water, lipoids and inorganic materials, of three main substances—nucleic acid, basic protein (histone or protamine), and chromosomin. The possible functions of these three substances are discussed. It is suggested that chromosomin may be responsible for the chemical basis of inheritance by suitable organization within the chromosomes. Nucleic acid—contrary to previous conceptions—may be the main constituent of the nuclear sap. This would explain several features, such as the viscosity of the resting nucleus, and the gel-like consistency of the spindle into which the sap is probably transformed at the metaphase stage of cell division. Histone may possibly regulate the mitotic process. There is much histone in resting nuclei and little in rapidly proliferating cell nuclei. The hypothesis is put forward that so long as there is sufficient histone present in the nucleus to combine with all the nucleic acid the spindle cannot form and so mitosis is prevented.—E. G. WHITE.

ZIETZSCHMANN, O. (1943). Wirbel- und Rippenvariationen im Brust-Lenden-Grenzgebiet beim Pferde. [**Variations of the dorsal and lumbar vertebrae and the ribs in horses**].—*Dtsch. tierärztl. Wschr.* **51.** 81–83. **1288**

Variations in the number of dorsal and lumbar vertebrae in the horse are not uncommon. As a rule, an increase in one region is compensated for by a decrease in the other, and the number of rib pairs coincides with the number of dorsal vertebrae. Z. records a case of an English Thoroughbred with 17 dorsal vertebrae, 6 lumbar vertebrae and 18 pairs of ribs. The vertebral articulations of the 17th pair of ribs were somewhat flattened but otherwise normal. The 18th pair of ribs articulated with the lateral terminations (the tips) of the transverse processes of the 1st lumbar vertebra. On the left side this rib was fused to the process while on the right it formed a moveable articulation; thus this left rib functioned only for muscular attachment whereas the right one fell into the category of a respiratory rib. In all other respects the 1st lumbar vertebra was typical. The intertransverse articulations of the lumbar region were modified and appeared to balance this irregular costo-vertebral union.—C. W. OTTAWAY.

See also absts. **1369** (frontiers in cytochemistry), **1246** (haematology of dogs and cats), **1263** (endocrine disturbances), **1366** (hormone effect of plant juices on cattle), **1225**, **1231**, **1232** (hormones and cancer), **1365** (artificial insemination).

POISONS AND POISONING

KEMPF, C. A. (1942). **A biochemical study on fluorine. I. Physiological responses to fluorine compounds in the rat. II. Attempts to remove fluoride to the non-toxic level in drinking water.**—*Iowa St. Coll. J. Sci.* **17.** 91–92. [Thesis: only abst. given]. **1289**

I. Regeneration of haemoglobin in anaemic rats

which received Cu and Fe as the fluorides was as good as that in rats which received the same metals in the form of $CuSO_4$ and $FeCl_3$. In rats given 0·05% sodium fluoride in their ration, the number of pregnancies was decreased by 50% and lactation was impaired; these effects, together with retardation of growth and damage to incisors, were overcome to a large extent by the addition of aluminium sulphate to the ration containing fluoride. The toxicity of sodium fluoride injected intraperitoneally was also decreased by administering aluminium sulphate intraperitoneally. Aluminium fluoride was non-toxic when injected intraperitoneally and was much less toxic than other fluorides. Large quantities of sodium fluoride, when given by stomach tube, caused marked hyperglycaemia but when fed at a level of 0·10% in the ration marked hypoglycaemia occurred after a 36-hour fast.

II. In small-scale laboratory experiments the amount of fluoride in Ankeny city water was decreased by treatment with both potassium alum and commercial aluminium sulphate. The time during which the water was in contact with the aluminium salt, the pH of the solution and the amount of aluminium sulphate used, were found to be factors affecting removal of fluoride.
—R. Allcroft.

—. (1941). **[Discussion on] fluorosis.** [Speakers :— Pandit, C. G., Aykroyd, W. R., Kehar, N. D., Viswanathan, G. R., Shortt, H. E., & Raghavaxhari, T. N. S.]—*Proc. 27th Indian Sci. Congr., 1940.* Pt. IV. pp. 123–126. **1290**

The prevalence of fluorosis in man and cattle in certain parts of India was discussed. The F concentration in the water of the Nellore district varied from 1–5 p.p.m., and mottled enamel was universally prevalent. The incidence and severity of the symptoms were inversely proportional to the vitamin C intake, both naturally in man and also in monkeys. Aykroyd described the symptoms seen in cattle in the Kurnool district of Madras, where incidence was less during the rains. Affected animals generally had low blood inorganic P and it is suggested that the condition in the cattle was fluorosis coupled with nutritional deficiency.
—S. N. Ray (India).

van der Walt, S. J., & Steyn, D. G. (1939-40). **Recent investigations into the toxicity of known and unknown poisonous plants in the Union of South Africa, IX & X.**—*Onderstepoort J. vet. Sci.* **12.** 335–366, and **15.** 261–277. [For previous parts see *V.B.* **10.** 711]. **1291**

IX. In all 33 plants belonging to a variety of orders were tested for toxicity. Members of the Aizoaceae, Apocynaceae, Asclepiadaceae, Compositae, Crassulaceae, Euphorbiaceae, Gentianaceae, Iridaceae, Leguminosae, Liliaceae, Rhamnaceae, Santalaceae. Scrophulariaceae, Solanaceae, Thymelaceae and Zygophyllaceae were subjected to toxicity tests.

Ten of the plants tested were for the first time shown to be toxic. These were *Lotononis laxa, Cotyledon coruscans, C. campanulata, Asaemia axillaris, Zygophyllum Morgsana, Urginea* sp., *Hymenochylus Smithii, Drosanthemum* sp., probably *D. hispidum, Chironia baccifera* and *Senecio* sp. ab. Kraamwinkel. *Dimorphotheca caulescens* and *Dichrostachys nyassana* were found to contain hydrocyanic acid.

The cotyledons could be grouped into three types according to the symptoms produced. One group caused symptoms of "krimpsiekte" (cotyledonosis), a nervous condition. Another group contained hydrocyanic acid and the third a factor causing intestinal irritation.

X. The authors tested for toxicity 22 plants collected from various sources in South Africa. Of these five proved toxic to animals, namely *Cryptolepis decidua, Cryptostemma calendulaceum, Helichrysum cephaloideum* var. *adscendens, Kedrostis nana*, and *Moraea setacea.*

The others tested were *Opuntia* sp., *Gnaphalium luteoalbum, Croton megalobotrys, Euphorbia glaucella, Euphorbia*, nearest sp. *E. pubescens. Jatropha capensis, Paspalum distichum, Leonotis leonurus, Bulbine longiscapa, B. namaensis, B. narcissifolia, Ornithogalum subulatum, Rumex acetosella, Solanum macrosolum. S. quadrangulare, Thesium namaquense*, and *Cissus* sp.
—E. M. Robinson (S. Africa).

Venkatachalam, V. (1943). **Common cattle poisoning.**—*Indian Fmg.* **4.** 571–575. **1292**

A popular article in which are enumerated the following plants which may cause cattle poisoning :— *Paspalum scorbiculatum, Lathyrus sativus, Lochnera pusilla, Rhododendron nilagiricum, Ficus elastica, Bambusa arundinaceae, Nerium odorum, Thevetia nereifolia, Ricinus communis, Croton tiglium, Gloriosa superba, Anamirta cocculus, Crinum defixum, Abrus precatorius, Sorghum vulgare*, and *Manihot utilissima.*
—N. D. Kehar (India).

Siegel, H., & Mushett, C. W. (1944). **Structural changes following administration of quinacrine hydrochloride.**—*Arch. Path.* **38.** 63–70. [Authors' summary copied *verbatim*]. **1293**

The pathologic alterations definitely attributed to quinacrine are the large necrotic foci in the [lobes of the] right side of the liver, the necrosis and fibrosis of the myocardium and voluntary muscle and the changes in the cortex of the adrenal gland, in the reticuloendothelial system and in the kidney. Only the changes in the adrenal gland, the kidney and the reticuloendothelial system are reversible.

The basophilic substance found within certain cells of quinacrine-dosed rats is probably quinacrine or a substance closely related to it.

Of changes in dogs, monkeys, chickens, hamsters, guinea pigs and rabbits, myocardial lesions were found only in hamsters. Only an occasional dog revealed necrosis of the liver. Changes in the hepatic cord cells and in the reticuloendothelial system similar to those found in the rat were present in all species.

See also absts. **1365** (poisonous plants, U.S.A.), **1296** (sulphanilamide toxicity in laying fowls), **1338** (phosgene poisoning in horses).

PHARMACOLOGY, THERAPEUTICS AND DISINFECTION

Venkatachalam, K., & Sastry, M. R. S. (1943). **Studies on *Alstonia scholaris*. A preliminary investigation on the utilization of the bark of *Alstonia scholaris* as a remedy against protozoal infections in animals.**—*Indian J. vet. Sci.* **13.** 328–329. **1294**

Echitamine hydrochloride, an active principle isolated from the bark of Indian *A. scholaris*, is not a protoplasmic poison *in vitro*. It induces a fall in blood pressure in anaesthetized animals while a rise is noticed after the sympathetic vasoconstrictors are paralysed with ergotoxine.—S. K. Talapatra (India).

Siebenmann, C., & Schnitzer, R. J. (1943). **Chemotherapeutic study of *p*-nitrobenzoyl and related compounds.**—*J. Amer. chem. Soc.* **65.** 2126–2128. **1295**

The *p*-nitrobenzoyl and the 3,5-di-nitrobenzoyl derivatives of a number of aromatic and hydro-aromatic hydroxy and amino compounds were prepared and tested for chemotherapeutic activity in mice. The *p*-nitrobenzoyl esters of 4-hexyl-resorcinol showed some activity against pneumococci. In the sulphonamide series, the N^1-benzoyl sulphanilamide was active against pneumococci, while the N^1-*p*-nitrobenzoyl compound showed activity against meningococci.—J. M. Robson.

Scott, H. M., Jungherr, E., & Matterson, L. D. (1944). **The effect of feeding sulfanilamide to the laying fowl.**—*Poult. Sci.* **23.** 446–453. **1296**

The possible value of sulphanilamide is recognized in the control of certain diseases considered to be potentially egg-borne, and in this connexion experiments were undertaken to study the effect of sulphanilamide on the laying hen.

Groups of 3–5 pullets were fed all mash diets containing varying levels of sulphanilamide. The experiments were designed to determine the effect of dosage upon egg production, egg weight, shell texture and shell thickness. An attempt was also made to inhibit the detrimental effect of sulphanilamide on egg shell texture by the administration of various substances. Usually the feeding of the drug extended over a period of seven days and was preceded by a preliminary period of observation of from 5–10 days.

It was found that 0·03% sulphanilamide in the ration of a laying pullet was tolerated, but that a concentration of 0·25% or more inhibited egg production. The intermediate levels of 0·03–0·25%, as also a single large dose (2·5 grains per lb. live weight), decreased the rate of production without completely inhibiting it. For the most part, the normal cycle was resumed 3–4 days after administration of the drug but two out of 12 birds receiving the single dose failed to lay again during the 16 days which comprised the test period.

The drug had an immediate effect on shell thickness and texture. It caused a thinning of the egg shell, with roughening of the surface and a decrease in shell pigment. With the smaller dosages (0·002–0·004%) shell texture appeared normal, but there was a definite decrease in shell thickness.

The blood calcium level was not altered even though sulphanilamide feeding decreased the thickness of the shell by 20% in the case of the 0·03% level. The addition of fish oil, calcium carbonate, casein, yeast and manganese to the ration containing sulphanilamide failed to alleviate the toxicity of the drug. Nor did supplements of stilboestrol, potassium iodide, ferric sulphate and copper sulphate have any effect in this connexion.

The work of Hinshaw & McNeil [*V. B.* **13.** 12] suggested that premature expulsion of the egg from the shell gland in hens given sulphanilamide offered a possible explanation for the decrease in shell thickness without a corresponding decrease in blood calcium. A further experiment was carried out to examine this point. Twelve pullets were fed a single dose of sulphanilamide (2·5 grains per lb. live body weight) after it had been made certain by digital pressure that an egg would be laid next day. Eight pullets laid prematurely during the night but a greater time elapsed before the other four laid than was usual, judging by their performance before sulphanilamide feeding had been tried. The shell thickness of the eggs laid by these four pullets decreased 17% on an average. It was therefore concluded that the adverse effect of the drug on shell texture could not be explained solely on the basis of premature expulsion from the shell gland but that it appeared to influence either directly or indirectly the normal physiology of the shell secreting glands.—J. D. Blaxland.

Romence, H., & Harkins, H. N. (1943). **Experimental studies on blood sulfanilamide levels attained after powdered drug administration by inhalation.**—*Proc. Soc. exp. Biol., N.Y.* **54.** 8–10. **1297**

Sulphanilamide was introduced into the lungs of dogs either by allowing the animals to breathe inside porous bags containing dispersed powdered sulphonamide, or by insufflation into the trachea under nembutal anaesthesia. By the first method, blood concentrations of 2·4 mg. per 100 ml. were attained without producing any ill effects. Much larger doses were introduced by the second method and blood concentrations of over 30 mg. per 100 ml. were attained. The local accumulation of sulphonamide in the respiratory tract may irritate the trachea and bronchi when it is introduced into the trachea.—E. Boyland.

Lee, S. W., Epstein, J. A., & Foley, E. J. (1943). **Synergistic action of thiourea and guanidine with sulfathiazole.**—*Proc. Soc. exp. Biol., N.Y.* **54.** 105–107. **1298**

Urea, guanidine and thiourea each increase the bacteriostatic action of sulphathiazole and sulphadiazine on *Bacterium coli*. This synergistic effect is greatest with thiourea and least with urea.—E. Boyland.

Lee, S. W., Epstein, J. A., & Foley, E. J. (1943). **Synergism of urea and sulfathiazole on *E. coli*. Effect of inoculum size.**—*Proc. Soc. exp. Biol., N.Y.* **54.** 107–108. **1299**

The synergistic inhibitory action of urea and sulphathiazole is greatest when the inocula are small. With high densities of organisms the substances may have a stimulating effect.—E. Boyland.

—. (1944). **Indications and contraindications for the use of penicillin.**—*Bull. U.S. Army med. Dep.* No. 77. p. 1. **1300**

This report was prepared by Dr. Chester Keeper of the Committee on Chemotherapeutic Agents of the National Research Council (U.S.A.). Penicillin is the best therapeutic agent available at present for the treatment of (1) all staphylococcal infections with and without bacteraemia, (2) all cases of clostridial infections (gas gangrene, malignant oedema), (3) all haemolytic streptococcal infections with bacteraemia and all serious local infections, (4) all anaerobic streptococcal infections (*e.g.* puerperal sepsis), (5) all pneumococcal infections of meninges, pleura, endocardium, and all cases of sulphonamide-resistant pneumococcal pneumonia, (6) all gonococcal infections complicated by arthritis, ophthalmia, endocarditis, peritonitis, epididymitis, and all cases of sulphonamide-resistant gonorrhoea, and (7) all meningococcal infections not responding to sulphonamides. A list is given of conditions in which penicillin is not effective ; it includes all Gram-negative infections, tuberculosis, acute rheumatic fever, ulcerative colitis and malaria.—J. M. Robson.

György, P., & Elmes, P. C. (1944). **Experiments on the toxicity of the calcium salt of penicillin.**—*Proc. Soc. exp. Biol., N.Y.* **55.** 76–77. **1301**

The calcium salt of penicillin is less deliquescent than the sodium salt and is therefore easier to handle. That it is no more toxic has been shown by subcutaneous injection of excessive doses in mice and human patients. —E. Boyland.

Garrod, L. P. (1945). **The action of penicillin on bacteria.**—*Brit. med. J.* Jan. 27th. 107–110. **1302**

Penicillin is bactericidal and acts like other disinfectants on *Staphylococcus aureus* in broth. The rate of destruction of bacteria generally becomes higher with increase in concentration, increase in temperature up to 42°C., and increase in the pH of the medium up to pH 7·5. The bactericidal action of penicillin becomes

less if the rate of division is reduced either by the dilution of the nutrient medium or the addition of sulphathiazole. The latter results support the hypothesis that penicillin acts only on dividing cells. On the other hand cells from both old and young cultures are destroyed by penicillin.—E. Boyland.

Todd, E. W., Turner, G. S., & Drew, L. G. W. (1945). **The temporary character of " fastness " of staphylococci to penicillin.**—*Brit. med. J.* Jan. 27th. 111–113. **1303**

Two strains of staphylococci were repeatedly subcultured in gradually increasing concentrations of penicillin in broth. Both strains became resistant to penicillin so that the concentration required to inhibit growth was increased up to three thousand times. When the resistant cultures were subcultured daily in broth the fastness was rapidly lost. It is suggested that organisms which had developed fastness *in vivo* would rapidly lose it on withdrawal of the drug.—E. Boyland.

Farley, D. L. (1944). **Canavalin, a new enzymatic bactericidal agent. Preliminary report.**—*Surg. Gynec. Obstet.* **79.** 83–88. **1304**

Canavalin is a mixture of an enzyme (extracted from the jack bean) and a co-enzyme (produced *in vitro* from thiamine and riboflavin), and has the power of oxidizing polysaccharides; *in vitro*, canavalin renders both Gram-positive and Gram-negative organisms incapable of growth. It can be injected into patients in large doses without producing any toxic effects. Preliminary clinical studies on a few cases are described.—J. M. R.

Andberg, W. G., & Weirether, F. J. (1944). **The effect of chemotherapeutic agents on the bovine mammary gland. II. The effect of tyrothricin.**—*Amer. J. vet. Res.* **5.** 6–13. [For part I, see *V. B.* **14.** 173]. **1305**

The authors have continued their studies on the action of chemotherapeutic substances in non-infected bovine mammary glands. The purpose of this study was to determine the effect of infusions of tyrothricin upon the apparently normal mammary tissue. Ten quarters in four cows were infused with tyrothricin-in-oil mixtures, each ml. containing 1 mg. of tyrothricin. Four quarters in two cows were injected with 40 ml. doses; six quarters in the other two cows were infused with 40 ml. on four successive days, 160 ml. per quarter in all. In all treated quarters an acute mastitis was set up similar to that produced by novoxil [see *V. B.* **14.** 173]. The quarters were enlarged, tender and firm, the milk was physically abnormal, the chlorides were increased and the lactose decreased. There was a polymorphonuclear leucocytosis in the milk. In the cows which received four daily treatments milk production had not returned to normal 126 days after the last infusion, and abnormal milk was seen intermittently up to 96 days after infusion. Abnormalities were also observed in the untreated quarters.—D. L. Hughes.

Daugherty, W. D. (1944). **Field experience with mastitis.**—*Iowa Vet.* **15.** 5–8. **1306**

The writer records his unsuccessful results in attempting to eradicate mastitis from four herds in his practice, by testing, segregation and treatment of positive animals with tyrothricin. The results in the first herd are typical of those obtained. After three months' control a completely negative report was obtained. After a further three months 16 out of 28 cows were positive. Nevertheless, D. thinks that from the clinical standpoint definite beneficial results accrued. He concludes that much has still to be learnt about mastitis. Now, as routine, he infuses all dry cows with tyrothricin and clinical cases with sulphanilamide in oil, all four quarters being treated. Successful results are reported in staphylococcal mastitis from infusion with sulphathiazole in distilled water.—H. I. Field.

Tredway, J. B., & Sadusk, J. F., Jr. (1941). **Observations on the response *in vitro* of the pneumococcus, staphylococcus, alpha hemolytic streptococcus, and Friedlander's bacillus to the sulfonamide drugs.**—*Yale J. Biol. Med.* **14.** 143–153. **1307**

With ten strains of pneumococci, sulphathiazole exerted the most marked effect on the growth of the bacteria and was followed, in decreasing order of efficiency, by sulphapyridine, sulphadiazine and sulphanilamide. Three strains of *Staphylococcus aureus* exhibited no alteration of their growth in broth containing the sulphonamides. Four strains of α-haemolytic streptococci showed wide variations in response to the drugs, but sulphathiazole was the most effective. Two strains of *Bact. friedländeri* exhibited the same growth tendencies. A marked variation in response from strain to strain of the same organism was observed.—J. M. R.

Zahl, P. A., Hutner, S. H., & Cooper, F. S. (1944). **Effect of sulfonamides on toxic and antigenic action of endotoxins of certain Gram-negative bacteria.**—*Proc. Soc. exp. Biol., N.Y.* **55.** 4–7. **1308**

Sulphanilamide, sulphathiazole, sulphapyridine, sulphadiazine, sulphamerazine and sulphaguanidine given orally to groups of mice conferred on them an equivalent, if limited, protective effect against the lethal action of the endotoxin of *Salmonella typhi-murium* which had been administered intraperitoneally; a further group was protected, to a limited extent at least, by sulphanilamide against the endotoxin of *Bact. flexneri*. Sulphathiazole administered during the successive immunization of mice with the endotoxin of *S. typhi-murium* did not appear to interfere with the process, judging by the degree of resistance acquired to the lethal action of the endotoxin. It is suggested that these results may apply to other sulphonamide derivatives and to the endotoxins of Gram-negative bacteria generally. Possible ways in which sulphonamides exert their protective effect are briefly discussed. —A. Eden.

Johnson, G., & Trussell, R. E. (1943). **Experimental basis for the chemotherapy of *Trichomonas vaginalis* infestations. I.**—*Proc. Soc. exp. Biol., N.Y.* **54.** 245–249 **1309**

The authors describe a standardized test of efficiency of 62 compounds tested. The following compounds in dilution of 1 : 1,000 or more were lethal to *T. vaginalis* in less than 10 min.: arsphenamine, clymocol, dihexylin, mercuric oxycyanide, neoarsphenamine, phemerol, phenyl mercuric acetate, phenyl mercuric benzoate, phenyl mercuric chloride, and phenyl mercuric nitrate, silver picrate, sulphadiazine, sulpharsphenamine, tartar emetic, and vuzin dihydrochloride.—D. D. Ogilvie.

Carmichael, J., & Bell, F. R. (1944). **The use of a new phenanthridinium compound 1553 in the treatment of Trypanosoma Congolense infection in cattle.** —*Vet. Rec.* **56.** 495–496. **1310**

The use of phenanthridinium compounds in the treatment of *T. congolense* infection of cattle is discussed. The main drawbacks of substance 897 [see *V. B.* **14.** 323.] are that it has a low solubility and the best method of administration is intravenously, that a single dose is not always curative, and that drug-fastness may develop with repetition. The new compound, 1553, whose composition is 2 : 7-diamino-9 phenyl-10 methyl-phenanthridinium bromide, can be used as a 4% solution by dissolving it in hot water and allowing it to cool, and it can be used subcutaneously. Used at doses of 1–2 mg. per kg. body weight it cured all of 19 cattle

with a chronic infection, whilst 16 out of 20 animals with an acute infection were cured by one dose, and the remaining four animals responded to a second dose. Doses up to twice the therapeutic dose are not toxic. —U. F. RICHARDSON.

HAWKING, F. (1944). **The absorption of 4 : 4′diamidino stilbene (stilbamidine) by trypanosomes and its blood concentration in animals.**—*J. Pharmacol.* **82.** 31–41. **1311**

Stilbamidine is absorbed *in vitro* by *Trypanosoma equiperdum* so that at equilibrium the concentration inside the organisms is 1,400 times as great as the external concentration. Absorption has been shown to occur *in vivo*. The rate of trypanocidal action is in approximate agreement with the equation :– (concentration) $0{\cdot}34 \times$ time = constant. It is possible to calculate that 3×10^8 molecules of trypanocidal drug are required to kill a trypanosome. Stilbamidine is rapidly excreted from the plasma of rabbits and mice.—E. BOYLAND.

WAY, E. L., & CHAN, L. K. (1944). **The toxicity and trypanocidal activity of p-sulfonamidophenylarsonic acid and certain of its derivatives.**—*J. Pharmacol.* **81.** 278–283. **1312**

Mice tolerate doses of 2,000 mg. per kg. of *p*-sulphonamidophenylarsonic acid and doses of 700 mg. per kg. cure *Trypanosoma brucei* and *T. equiperdum* infections. Some N-substituted derivatives of sulphonamidophenylarsonic acid were found to have no trypanocidal action. The tolerated dose of propamidine was 40 mg. per kg. body weight and the curative dose was 5 mg. per kg.—E. BOYLAND.

CARMICHAEL, J. (1944). **The aromatic diamidines in the treatment of trypanosomiasis and babesiasis.**—*J. comp. Path.* **54.** 183–188. **1313**

Five diamidino diphenyl compounds were tested without success in the treatment of *T. congolense* infections in cattle. One of the compounds, "phenamidine" (4 : 4′-diamidino diphenyl ether) was found to be effective and non-toxic in the treatment of canine babesiasis. Phenamidine was injected subcutaneously in doses of 10 mg. per kg. body weight. One hundred and forty dogs have been treated, of which only four relapsed ; these four recovered completely after a second treatment. 3 g. of the drug were given to a horse weighing about 10,000 lb. without producing any ill effects, and gave excellent results in controlling *Babesia caballi*.—E. BOYLAND.

I. MARKOV, A. A., & ABRAMOV, I. V. (1940). Pervyĭ opyt ispytaniya sovetskovo preparata tripanblau (tripansin') pri eksperimental'nom piroplazmoze loshadeĭ (Piroplasma caballi). [**First test of trypanblue produced in the U.S.S.R. on *Babesia caballi* infection**].—*Trud. vsesoyuz. Inst. eksp. Vet.* **15.** 119–120. [French summary]. **1314**

II. KAZANSKIĬ, I. I., & ABRAMOV, I. V. (1940). Metodika biologicheskoĭ aprobatsii tripanblau sovetskovo proizvodstva (tripansin'). [**Technique for biological assay of trypanblue prepared in the U.S.S.R.**].—*Ibid.* 129–132. [French summary]. **1315**

I. One sample of a series of batches of trypanblue prepared at the Moscow Institute of Experimental Pharmaceutical Chemistry was examined. No toxic symptoms were observed after intravenous administration to three healthy horses, of a 1% solution in sterile isotonic saline, at a dose rate of 0·01 ml. per kg. live weight (two cases), and 0·02 ml. per kg. (one case). On the day of injection, all three animals were infected with *Babesia caballi*. No temperature reactions occurred, and no parasites were found in the blood of any of the horses during the following month.

For the investigation of the therapeutic properties of the preparation, ten horses were infected with *B. caballi* by subcutaneous injection of 10 ml. of virulent blood in 5 ml. of 2% sodium citrate solution. Of these animals one died before treatment was applied, and three gave only slight reactions. The remaining six were employed in the test, treatment being administered when the disease reaction was well defined ; the time after infection is not stated. Three horses received 0·005 g. per kg. live weight in 1% solution of the Moscow preparation, one received an equal dose of imported trypanblue, and two remained untreated as controls.

In the horses treated with the Russian preparation, parasites disappeared from the peripheral blood on the 3rd day in two cases, and on the 4th day in the 3rd case, while in the case given the imported product, the blood was free of parasites on the 2nd day after administration. The Russian preparation caused slight temporary toxic symptoms in the sick animals (uncertain gait, etc.). Piroplasms reappeared 14 days later in two of the cases treated with the Moscow preparation, and one of these showed a sharp temporary rise in temperature. One of the untreated controls died on the 23rd day after infection.

The authors conclude that while the Russian preparation appears to have quite good preventive and curative properties, it is necessary to obtain qualitative improvement and to examine its action in extended tests under conditions of natural infection.

II. On account of the colloidal nature of trypanblue, and of the possible occurrence of therapeutically inactive isomers, preparations have to be tested biologically before being issued for use. The authors examined the question of assessment of the quality of trypanblue prepared in the U.S.S.R. They refer to similar work by MARKOV & ABRAMOV [see I], and by SALYAEV & PINES, and KAZANSKIĬ *et al.* [originals not available].

The physicochemical properties of 44 series of batches of the drug were examined ; the toxic qualities of several batches were observed (on 60 mice, 9 dogs, and 7 horses), and toxic symptoms following heavy doses are described ; the therapeutic effects were studied of one imported, and two Russian preparations, against experimental *Babesia caballi* infections. Clinical results and blood findings are tabulated. The authors conclude that in routine assessment of the drug, the following features should be considered :– (1) physicochemical properties—(a) colour, and degree of staining of the tissues, (b) solubility (in distilled water and isotonic saline), filtrability, and stability under steam sterilization for 30 min. and subsequent cooling to 25°C. ; (2) toxicity : doses of 0·05 g. per kg. body weight should be non-toxic for mice, and horses should tolerate 0·02 g. per kg. without collateral symptoms ; (3) therapeutic effect : against *B. caballi* infections a response should be produced within a given time, yet to be ascertained. In general, doses of 0·005 g. per kg. body weight intravenously reduced the temperature within 12–96 hours, and cleared the peripheral blood within 24–96 hours. Between the 13th and 18th days after treatment there were frequent relapses with secondary rise in temperature, and reappearance of parasites. When relapse occurs, the animals should recover spontaneously without further treatment.

The authors consider that preparations fulfilling these requirements may be considered fit for general use. They suggest that it is not essential to test every series of batches of the preparation on horses, but that the horse tests may be applied to grouped samples, which give similar results in the physico-chemical and

mouse tests. This procedure would reduce the cost of manufacture of the drug.—J. Allan Campbell.

Abramov, I. V. (1940). Ispytanie piroplazmina s profilakticheskoĭ tsel'yu. **[Test of the prophylactic use of piroplasmin]**.—*Trud. vsesoyuz. Inst. eksp. Vet.* **15.** 121–122. [French summary]. **1316**

In earlier work, piroplasmin [= atebrin] therapy gave good results against mixed piroplasm infections in sheep (Abramov 1936), and evidence of prophylactic value was obtained in canine piroplasmosis (Pines and Abramov, 1936). A. has now tested its prophylactic properties in horses, in cattle, and in sheep. In a horse, 0·0006 g. piroplasmin per kg. body weight was administered intramuscularly, and ten days later the animal was infected with *Nuttalia equi*. Parasites were readily recognized seven days later.

Two bovines received 0·003 g. piroplasmin per kg. body weight, and five days later they and a control animal were infected with *Theileria mutans*. The infection developed in all three animals.

Of three sheep infected with *Babesiella, Françaiella,* and *Piroplasma ovis* [A.'s nomenclature], two had received piroplasmin [dose not stated] seven days previously. All three animals developed severe infections. Two further sheep were given piroplasmin subcutaneously on the day of infection. Only slight infections developed and in one, the incubation period was prolonged by three days.

Thus no preventive action was demonstrated, but in sheep there was evidence of a " precocious therapeutic effect ".—J. Allan Campbell.

*Schönhöfer, F., & Henecka, H. (1942). Piroplasmose-Heilmittel der Chinolin-Reihe. **[Treatment of piroplasmosis with drugs of the quinoline series]**. —*Abh. med.-chem. Forschstätten I.G. Farbenindustrie A.-G.* **4.** 156–163. [Abst. from abst. in *Jber. Vet.-Med.* **71.** 192–193]. **1317**

Starting from the assumption that the activity of trypaflavine on piroplasms depends on the quartan nitrogen ring, research has been carried on for 11 years on naganol-like substances which contain quartan heterocyclically linked nitrogen atoms. Research was then shifted to the quinolines, and from this it became apparent that piroplasmal remedies must be sought under the relatively low molecular acid amides, quartan quinoline compounds with a urea linkage. Amongst the symmetric and asymmetric ureas of the quinoline series " acaprin " is 80 times more active than trypaflavine and its therapeutic index is 8 times greater. In further research it was shown that the urea linkage was not essential. Azoxy or azo compounds have good piroplasmocidal activity if the linkage occurs at 6 or 7. On the other hand a sulphonamide linkage showed no advantage in respect of activity on piroplasms.

—U. F. Richardson.

Kikuth, W., & Schmidt, H. (1943). Zur Therapie der Leishmaniosen im Mittelmeerraum. **[The therapy of leishmaniasis in the Mediterranean area]**.—*Dtsch. tropenmed. Z.* **47.** 247–252. **1318**

The authors discuss the treatment of leishmaniasis in the Mediterranean area, and point out that the distribution of the disease is far wider than was thought ten years ago. Cases have been recorded in southern Italy, Spain, Yugoslavia, southern France, and South Russia, and it is now known that adults may contract infection as well as children. The Mediterranean type of disease differs from kala-azar of India and East Asia in that it is associated with an infection of dogs, and in that it does not respond as readily to treatment with neostibosan. In view of the latter fact, attempts have been made to find a more efficient drug, and it is claimed that solustibosan (antimony gluconate) has given satisfactory results. When this was used as an isotonic solution too great a quantity was required, but a concentrated solution (1 ml. = 100 mg. Sb) could be used intramuscularly or intravenously. An oily suspension (1 ml. = 54 mg. Sb) gave even better results, and overcame the disadvantage of too rapid excretion of the drug. The oily suspension has been used intramuscularly in children by giving a total dose of 1 ml. per kg. body weight in five doses, one every other day. The concentrated solution has been used intramuscularly, a total dose of 0·4 ml. per kg. body weight being given in ten doses at 12-hour intervals. This solution has also given good results when injected locally into the lesion in cases of oriental sore.—U. F. Richardson.

Fulton, J. D. (1944). **The therapeutic action of some newer aromatic diamidines on *Leishmania donovani* infections of golden hamsters (*Cricetus auratus*).**—*Ann. trop. Med. Parasit.* **38.** 147–158. **1319**

A course of ten doses of 20 mg. each of stilbamidine or of 4 : 4′ diamidino-2-hydroxy stilbene (given on alternate days) was effective in treating experimental *L. donovani* infections. The monomethyl and dimethyl derivatives of stilbamidine were somewhat less effective. Diamidino diphenyl sulphone and diamidino diphenylhexane were ineffective while diamidino tolane and diamidino diphenyl urea showed but little activity.

—E. Boyland.

*Koffman, M. (1943). Undersökningar angående den terapeutiska effekten av preparatet " Fentiazin Leo " vid behandling av coccidios hos kanin. **[The efficacy of phenothiazine in the treatment of rabbit coccidiosis]**.—*Skand. VetTidskr.* **33.** 69–83. [Abst. from abst. in *Jber. Vet.-Med.* **71.** 93]. **1320**

The treatment of infected rabbits with phenothiazine did not reduce the number of coccidia as compared with the numbers present in control animals which were given hygienic treatment only. Treatment did not interfere with the subsequent development of oocysts in the faeces. The mortality was greater among the treated animals than among the controls.—C. H. S.

Alston, J. M., & Broom, J. C. (1944). **The action of penicillin on leptospira and on leptospiral infections in guinea-pigs.**—*Brit. med. J.* Dec. 2nd. 718–719. **0321**

Penicillin inhibited the growth *in vitro* of nine strains of *L. icterohaemorrhagiae* and one strain of *L. canicola*. If penicillin is given to infected g. pigs soon after infection the mortality is reduced. Successful treatment does not prevent the development of a protective immunity.—E. Boyland.

Dorn, K. (1944). Die Behandlung der Spirochätose des Kaninchens. **[Treatment of venereal spirochaetosis of rabbits]**.—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **52/50.** 87. **1322**

Articles have appeared in the German press recommending that neoarsphenamine be administered intramuscularly for the treatment of venereal spirochaetosis of rabbits [*Treponema cuniculi* infection].

It is pointed out that this drug is irritant if given intramuscularly, and that though it can be used intravenously, a better drug is available in solusalvarsan, which when used intramuscularly, in doses of 1 ml. per 5 kg. body weight, leads to healing of the ulcers in 8–10 days.—U. F. Richardson.

Weinman, D. (1943). **Effects of gramicidin and tyrocidine on pathogenic protozoa and a spirochete.** —*Proc. Soc. exp. Biol., N.Y.* **54.** 38–40. **1323**

In a series of *in vitro* tests tyrocidine inhibited the growth of *Leishmania tropica, Trypanosoma cruzi* and *T. lewisi,* but did not check the growth of *Leptospira*

icterohaemorrhagiae or *Bartonella bacilliformis*. Gramicidin had no effect on any of the organisms tested, all of which were Gram-negative. Tyrothricin (containing 10–20% gramicidin and 40–60% tyrocidine) killed *Trichomonas vaginalis in vitro*.

In clinical tests, tyrothricin caused an immediate disappearance of trichomonads, but the organisms reappeared in a few days and were no longer sensitive to tyrothricin.—E. BOYLAND.

*REMLINGER, P., & BAILLY, J. (1942). Action "in vitro" du Dagénan sur les virus rabique et d'Aujeszky. [*In vitro* **action of sulphapyridine on rabies and Aujeszky's viruses**].—*Maroc méd.* p. 157. [Abst. from abst. in *Bull. Inst. Pasteur.* **42.** 19]. **1324**

Although completely inactive *in vivo* against the virus of Aujeszky's disease, sulphapyridine *in vitro* exerted a well marked effect on both that virus and the virus of rabies. The mechanism of the action is discussed. It is considered to be dissimilar to that between sulphonamides and bacteria. It is postulated that in concentrated solution a precipitate of sulphapyridine or of some of its constituents occurs on the active groupings of the virus toxalbumin, resulting in complete loss of affinity of the virus for its particular ectodermic tissues. —D. D. OGILVIE.

*HASE, A. (1942). Über Entlausung durch Ameisen sowie über die Wirkung der Ameisensäure auf Kleiderläuse. [**Delousing action of ants and the use of formic acid on the body louse**].—*Z. Parasitenk.* **12.** 665–677. [Abst. from abst. in *Dtsch. tropenmed. Z.* **47.** 97]. **1325**

Research confirms that insect-eating ants eliminate not only body lice in all stages of development which infest human beings, but their eggs and faeces and also the bodies of dead ones; 23–27% formic acid, however, is not an efficient delousing agent. It kills lice after some hours, but does not kill the nits. It also causes skin inflammation, and cannot be used on sensitive skins.—U. F. RICHARDSON.

MADDEN, A. H., LINDQUIST, A. W., & KNIPLING, E. F. (1944). **Tests of repellents against chiggers.**—*J. econ. Ent.* **37.** 283–286. **1326**

The treatment of clothing with a repellent was found to be the most effective method against *Acariscus* and *Eutrombicula* spp. Of the repellents tested, 25% solutions of indalone or of Rutgers 612 in a petroleum distillate boiling at 350°–400°F., and dimethyl phthalate in benzene gave good protection up to 30 days after treatment. Because of its cheapness and availability, dimethyl phthalate was considered the most satisfactory.—W. MOORE.

ATKESON, F. W., BORGMANN, A. R., SMITH, R. C., & SHAW, A. O. (1944). **Relative effects of several base oils used in livestock sprays on the skin of cattle.**—*J. econ. Ent.* **37.** 419–428. **1327**

The authors present results of experiments extending over two years on the testing of livestock spray materials by the skin reaction of dairy cows. Contrary to published results, they found the Saybolt viscosity of an oil was not a true index of skin reaction, but that the percentage of unsulphonated residue was a much more reliable guide. Oils with a 92·5–100% unsulphonated residue were satisfactory, while those containing 87·5% or less were unsatisfactory. Even where the animals were sprayed daily for 20 days with 2–3 times the normal dosage, the injury caused by an oil with a low unsul honated residue was of minor importance. —W. MOORE.

BRADSHAW, D. B. (1944). **Tetraethylthiuram monosulphide in the treatment of scabies.**—*Lancet.* **247.** 273–274. **1328**

A dilution of one part "Tetmosol" lotion (containing 25% T.E.T.M.S.) to three parts of water cured 97% of cases of scabies in children in three days. It showed little tendency to produce dermatitis, and the application was painless even upon open sores and raw areas. There was no action upon skin sepsis and the drug appeared to have no *in vitro* action on *Staphylococcus aureus*.—W. MOORE.

TRIM, A. R. (1944). **Experiments on the mode of action of hexyl resorcinol as an anthelmintic.**—*Parasitology.* **35.** 209–219. **1329**

These experiments were designed to investigate *in vitro* the action of hexyl resorcinol on *Ascaris lumbricoides* of pigs. Although the varying experimental conditions were not necessarily analogous with those found in the pig's intestine, the result of one *in vivo* test indicates that probably some of the effects obtained *in vitro* do occur *in vivo*. The main path of entry of hexyl resorcinol into the worms was through the cuticle. The rate of penetration of the drug was influenced by various factors; it was increased by certain concentrations of sodium oleate and by 1% glucose, and was decreased by gastric mucin, certain concentrations of bile salts, and soaps. Drug concentration, the pH of the medium, temperature and anaerobiosis had no appreciable effect on the rate of penetration, neither had the presence of proteins and protein digestion products, and a number of other substances, including a variety of drugs and certain nutrient substances. It is emphasized that the strongly inhibitory action of gastric mucin on the action of the drug may play an important role under natural conditions.—M. L. BINGHAM.

ROGERS, W. P. (1944). **Studies on the anthelmintic activity of hexylresorcinol and tetrachlorethylene.**—*Parasitology.* **36.** 98–109. **1330**

R. describes a perfusion technique for the estimation of anthelmintic activity in the small intestine and the conditions which govern it. Sections of the intestine of rats infested with *Nippostrongylus muris* were used, the efficacy of the drug tested being estimated by scraping the mucosa of the small intestine into aerated Tyrode's solution + glucose at 38°C. and observing the proportion of active worms after half a minute and after being incubated in the solution for one hour. The effect of bile salts and detergents on the anthelmintic action of hexylresorcinol and tetrachlorethylene was determined by this method and also the effect of the protective action of the mucus which surrounds the parasites in the intestine.

It was found that the efficiency of hexylresorcinol was reduced by 50% in 1% sodium tauroglycocholate, which reached a concentration of 1·3% in the rat's small intestine. The adsorption of hexylresorcinol on mucus prevented its penetrating to the worms under the mucus. Its inhibition by bile salts and its adsorption by mucin account for the inactivity of the drug in the rat.

Tetrachlorethylene stimulated *Nippostrongylus muris* to leave the mucus for the intestinal fluids, and it was not inhibited by bile salts. This drug acts rapidly in the rat.

The soaps, sodium laurate and sodium oleate, activated hexylresorcinol at pH 6·5, the latter being the more effective. In concentrations of 0·2–1·0% of the soap it was inhibited, and when present in concentrations higher than 1·0% the soap killed the nematodes in virtue of its intrinsic anthelmintic properties.

R. discusses the effect on drug activity of the various factors examined, and points out that the degree of toxicity to parasites, combined with the relative

importance of the inhibitory factors, determines the efficacy of an anthelmintic. Substances less toxic to nematodes than hexylresorcinol, but not inhibited by mucus and bile, may be more effective. The wide range of activity of tetrachlorethylene is attributable to the fact that bile salts and mucus have little inhibitory action upon it.—T. E. GIBSON.

RAO, B. M. (1944). **Nasal granuloma—its treatment under field conditions.**—*Indian vet. J.* **21.** 43–44. **1331**

The author treated six animals affected with nasal schistosomiasis by five intravenous injections of tartar emetic, 10 grains in 20 ml. distilled water on the first, third and fifth days and 13 grains on the eleventh and eighteenth days. Thirty-three days after the last injection all symptoms had subsided.—H. D. SRIVASTAVA (INDIA).

SCHMID, F., & WERNER, J. (1943). Die Wirkung von Wurmmitteln auf die verschiedenen Strongylidenarten des Pferdes. VIII. Santostibin. [**Action of anthelmintics on horse strongyles. VIII. Santostibin**].—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 51. [For previous parts, see *V. B.* **13.** 265]. **1332**

The authors describe a test on seven horses of the proprietary anthelmintic, santostibin, which is claimed to combine the anthelmintic properties of antimony, santonin, filix mas, and naphthalene. The dose employed was 50 g. and was administered over three days, 15 g. being given on each of the first two days and 20 g. on the third day. The daily dose was administered in a hollowed-out piece of bread, and no special pre-treatment was carried out. There was a definite lowering of the egg count in all cases ; in some instances the action on *Trichonema* spp. was more pronounced than on *Strongylus* spp., whilst at other times the reverse was the case. Examination of the horses three weeks and three months after the end of treatment showed that the egg counts remained low or increased only very little. The authors conclude that santostibin is an effective anthelmintic against all species of horse strongyles.

—T. E. GIBSON.

HARWOOD, P. D., & GUTHRIE, J. E. (1944). **The effect of nicotine-bentonite and of certain physical states upon the efficacy of phenothiazine against nematodes in fowls.**—*J. Parasit.* **30.** 143–152. **1333**

The authors describe a series of experiments on the use of mixtures of nicotine-bentonite and phenothiazine for the elimination of *Ascaridia galli* and *Heterakis gallinae* from poultry. Nicotine-bentonite, a specially prepared nicotine compound containing 5% of nicotine expressed as alkaloid, has been reported by other workers to have considerable efficacy when used alone against *Ascaridia*, whilst phenothiazine is more active against *Heterakis*. The birds used were of four different breeds and were in most cases kept in individual cages and their faeces collected and examined every 24 hours after treatment. Two to four days after treatment the birds were killed and the intestinal worms counted.

Ten different tests, in which over 100 naturally infected cockerels were employed, were made to ascertain the usefulness of the nicotine-bentonite and phenothiazine mixture and it was found that the most effective method of administration was in the form of a tablet weighing 1·33 ± 0·29 g. and containing one part of phenothiazine to two parts of nicotine-bentonite. This tablet was 94·5% efficient against *Ascaridia* and 93·5% efficient against *Heterakis*. In a toxicity test, 40 of these tablets containing a total of 1·76 g. of nicotine alkaloid, were administered to a cockerel without untoward results. The size of the phenothiazine particles appeared not to influence the efficacy of the tablets, those prepared from coarse phenothiazine being equally as effective as those prepared from micronized phenothiazine. A test to compare the efficacy against *Heterakis* and *Ascaridia* of "wettable" phenothiazine (containing 1·3% of "algin" and gum "karaya") and the "non-wettable" powder showed there was no appreciable difference in action between the two preparations.—T. E. GIBSON.

TURNER, F. C. (1943). **Experimental chemotherapy of tumors in mice.**—*J. nat. Cancer Inst.* **4.** 265–270. **1334**

Since 1936 a total of 977 chemical substances and mixtures of substances have been tested on 18,395 tumour-bearing mice. No effective remedy has been found. The present paper deals with a series of 132 chemicals tested on spontaneous mammary cancer in mice, and forms part of the much larger study. The chemical substances included inorganic compounds ; simple and complex aliphatic organic compounds ; benzene, anthracene and naphthalene derivatives ; phenanthrene derivatives ; neoprontosil, trypanblue, vitamin D_2 ; codeine, thebaine and morphine derivatives ; riboflavin, thiamine and chaulmoogric acid. They were given intraperitoneally, intravenously or subcutaneously.—E. G. WHITE.

HUEPER, W. C. (1944). **Experimental studies on the therapy and prevention of degenerative vascular diseases. I. The effect of medication with potassium thiocyanate on experimental cholesterol atheromatosis.**—*Arch. Path.* **38.** 93–98. [Author's summary copied *verbatim*]. **1335**

Potassium thiocyanate administered to dogs and rabbits kept on a normal diet produces a moderate increase of the hemoglobin content and of the cholesterol level of the blood and causes development of albuminous, fibrotic and hyaline intimal lesions in the aorta, its branches and the splenic arterioles.

Rabbits fed cholesterol and potassium thiocyanate show hypercholesteremia and hyperhemoglobinemia, but the production of atheromatous lesions in these animals is distinctly impaired.

The preventive action of thiocyanate on the development of cholesterol atheromatosis is not due to a lowering of the blood cholesterol level or to an increase in the production of thyroid hormone but is probably related to a stabilizing effect on the colloidal equilibrium of the plasma.

HAYDEN, A. F., & BIGGER, J. W. (1945). **Prophylaxis of respiratory tract infections with sulphanilamide lozenges.**—*Brit. med. J.* Jan. 20th. 81. **1336**

Tests with sulphanilamide lozenges, in which soldiers in training used five 0·065 g. lozenges daily for 16 days, failed to demonstrate any protective effect against respiratory tract infections, despite the fact that a concentration of 300 mg. % sulphanilamide was attained in the saliva.—D. D. OGILVIE.

APPLEBY, A. (1944). **Calcium boro-gluconate-saccharate : preparation, toxicity and effect on serum calcium level in cows.**—*Amer. J. vet. Res.* **5.** 312–315. **1337**

On the assumption that the compound which makes available to the animal the most calcium will be the most efficient in the treatment of milk fever, a search was instituted for a compound closely related to Ca gluconate but containing more Ca per unit weight. The compound finally chosen was Ca *d*-saccharate which contains 39% more Ca than does the same weight of Ca *d*-gluconate. The main difficulty in utilization of the compound was its insolubility. Boric acid does not increase its solubility sufficiently, but Ca gluconate and Ca saccharate in water manifest a mutual solubility-increasing effect. Accordingly the following formula

was used: 100 g. Ca *d*-gluconate, 10 g. boric acid, 37·5 g. Ca *d*-saccharate, and 500 ml. distilled water.

The mixture by boiling gives Ca boro-saccharate-gluconate, which is stable and is less toxic for rabbits and no more toxic for cows than Ca boro-gluconate. Intravenous injection in cows causes an immediate rise in serum Ca. This is followed, as when Ca boro-gluconate is used, by a rapid drop, but in the case of Ca boro-saccharate-gluconate solution, there is a secondary rise about half an hour after injection.—D. D. O.

KOMAROV, N. M. (1940). Vliyanie myshechnoĭ raboty na sostoyanie loshadeĭ pri toksicheskom oteke legkikh. Soobshchenie 1-e. **[Influence of muscular exercise on horses with pulmonary oedema. I].**—*Veterinariya, Moscow.* No. 2. pp. 129–136. [French summary]. [For part II, see *V. B.* **13.** 225]. **1338**

K. reviews literature dealing with the beneficial results of muscular exercise on various cardiovascular, respiratory, gastro-intestinal and other diseases of human beings. He also discusses the emphasis placed by some authors on complete absence of muscular activity in persons and animals affected with pulmonary oedema due to war gases.

K. carried out experiments on 63 horses, 9–17 years old, divided into seven groups. In most of the experiments, the horses were exposed to phosgene in special chambers for 15 min., at a concentration of 0·6–1·3 mg. per litre. *First group* :– Six horses were given walking exercise [duration not stated] without a load, 10–15 min. after exposure. Four died during the acute stage (4–25 hours after exposure), one after six days, and one survived. Of four controls (exposed to gas, but not exercised), three died within 7–27 hours, and one after seven days.

Second group :– Three horses were given trotting exercise for a distance of 5 km. in 30 min. without a load, 10–15 min. after exposure. Two died on the 5th and 13th day respectively, and of three controls, one died on the 38th day and the other two recovered.

Third group :– Five horses were given trotting and walking exercise for 15 km. for two hours without a load, 10–15 min. after exposure. All recovered and out of five controls, two died during the acute stage, one on the tenth day, and two recovered.

Fourth group :– Four horses were given trotting and walking exercise for 30 km. for 5–5½ hours without a load, 10–15 min. after exposure. One horse died during the acute stage, and three recovered. Of two controls, one died during the acute stage, and one recovered.

Fifth group :– Five horses were given trotting exercise with rider over a distance of 3–5 km. for 14–30 min., 10–15 min. after exposure. One animal died and four recovered, whereas out of five controls, four died in the acute stages of the disease and one recovered. Also, out of four horses which were exposed to a higher concentration after the same exercise, one recovered, two died in the later stages, and one died at the same time as the control horses which were exposed to a lower gas concentration.

Sixth group :– Six horses were used for pulling a load for 12–20 km. for 3–5 hours. One horse died and five recovered; out of three controls, one died in the acute stages, and the others recovered.

Seventh group :–Various exercises were given for 4–6 hours, and 3–6 hours after exposure, at the time when the pulmonary oedema was already clinically recognizable. Out of five horses one which was only walked died after nine hours; four which pulled a load (500 kg.) recovered.

K. concludes that muscular exercise during the development of pulmonary oedema is not harmful. Brisk exercise, during the first few hours after exposure, of a suitable nature for the type of horse concerned, prevents the development of serious consequences. In K.'s opinion, there is no need under field conditions to remove affected horses in ambulances.—A. MOLDAWSKY.

—. (1944). **The treatment of "wound shock". (Instructions produced by the Medical Research Council committees on traumatic shock and on blood transfusion, in co-operation with the Army Medical Service).**—*War Memo. med. Res. Coun., Lond.* No. 1. pp. 32. [6d.] [2nd Edit.] **1339**

This memorandum describes the symptoms, mechanism and treatment of wound shock in man. The symptoms and course of oligaemic "shock" are given and the variations caused by the special forms of trauma, such as burns, crushing and blast injuries, are clearly differentiated. Much of the section on treatment is concerned with the restoration of normal blood function by transfusion, including the choice of fluid, the amount and the rate of administration, and the danger of pulmonary oedema due to over-transfusion.

Recommendations include the use of light general anaesthesia, with local but not spinal anaesthetics where much operative interference is necessary, the use of intravenous saline and glucose saline solutions against dehydration only, the administration *ad lib.* of 2% sodium lactate solution orally in view of the efficacy of the sodium ion in experimental work on recovery from shock, and the early use of diuretics and urinary alkalizers where the crush syndrome is suspected, to mitigate renal damage.

Appendixes contain details of the apparatus used and the technique of withdrawing, storing, and of administering blood and blood products.—R. A. ROPER.

GAUSE, G. F., & BRAZHNIKOVA, M. G. (1944). **Gramicidin S and its use in the treatment of infected wounds. [Correspondence].**—*Nature, Lond.* **154.** 703. **1340**

A new strain of aerobic sporulating bacillus has been isolated from the soil and called the Gause-Brazhnikova strain. Extracts yield an antibacterial substance which is easily crystallizable from alcoholic solutions. This substance, called gramicidin S, is different from gramicidin and tyrocidine. It is about four times more efficient than tyrothricin in killing staphylococci *in vitro*, and is active against *Clostridium welchii* and *Cl. histolyticum*; both substances have very similar toxicities in rats. It has a beneficial effect in experimental wounds in g. pigs infected with *Cl. welchii* and in experimental wounds in rats infected with garden soil. Encouraging results have also been obtained in a number of clinical conditions, including gunshot wounds, empyema and osteomyelitis.—J. M. ROBSON.

HOFFMANN, C. E., & RAHN, O. (1944). **The bactericidal and bacteriostatic action of crystal violet.**—*J. Bact.* **47.** 177–186. **1341**

A report is given of the action of crystal violet on cultures of *Bacterium coli* and *Streptococcus lactis*. Ingraham (1933) had investigated the action of gentian violet in bacteriostatic concentration on various types of bacteria. She stated that growth is affected only during the lag phase and that bacterial cells are not modified during that period. The authors repeated and confirmed some of her experiments, but in all their experiments the number of organisms decreased greatly during the lag period, usually to less than 1% of the inoculum. Their studies make clear that the bactericidal and bacteriostatic effects are due to different chemical reactions.

In a certain range of dilutions, crystal violet acts strictly as a disinfectant and behaves like all other disinfectants, *viz*, it kills in proportion to its concentra-

tion ; young cells are killed more rapidly than old ones, and the action is very little affected by changes in acidity. This disinfectant action is probably due to a combination of the dye with some indispensable constituent of the organisms.

In a lower range of dilutions, and the range varies greatly with the test organism, the dye acts as a bacteriostatic. When a dye (gentian violet or crystal violet) in very dilute solution is added to a bacterial suspension, the bacteria remain quiescent during the lag phase. If the concentration of the dye is low enough to allow the bacteria time to bring about change in the oxidation-reduction potential of the medium, it is brought to the correct potential for multiplication. The bacteriostatic action is not influenced by the age of the test organism, by the pH, or by the concentration of the dye. In this range of dilutions the organisms usually overcome the dye action and multiply after a long lag period. The lag period increases with increased oxygen concentration and with increasing pH. This bacteriostatic action is probably due to the action of the dye in poising the potential of the medium in a range unfavourable for multiplication of the organisms.—M. Crawford.

Salle, A. J., & Ginoza, Y. W. (1943). **Effect of certain organic compounds on germicidal efficiency of mercuric chloride.**—*Proc. Soc. exp. Biol., N.Y.* **54.** 85–87. **1342**

The germicidal action of mercuric chloride on *Staphylococcus aureus* is not affected by the presence of carbohydrates, but is reduced by proteins, peptones and amino acids. Cysteine was more effective than other amino acids in neutralizing the bactericidal action.
—E. Boyland.

Salle, A. J., & Guest, H. L. (1944). **Increased efficiency of phenolic germicides by addition of inorganic salts to produce oxidation-reduction systems.**—*Proc. Soc. exp. Biol., N.Y.* **55.** 26–28. **1343**

The addition of an appropriate metallic salt (ferric chloride, ferric sulphate) to the organic compounds phenol, cresol, and hexylresorcinol to produce oxidation-reduction systems resulted in a great increase in the efficiency of the germicides for *Staphylococcus aureus*. The addition of another oxidation-reduction system to phenol and cresol, composed of ferrous and ferric chlorides, increased still further the efficiency of the germicides. It was found that maximum efficiency only occurred if the germicides were mixed in certain definite proportions.—G. D. S.

See also absts. **1370** (modes of drug action), **1293** (quinacrine), **1145** (experimental treatment of mastitis in chick embryo), **1148**, **1149** (vitamin°C in TB.), **1170** (treatment of piroplasmosis in reindeer), **1239** (of bovine granular vaginitis), **1225** (hormone therapy of cancer), **1253** (of sterility), **1214** (treatment of arsenical poisoning), **1365** (of mastitis, of coccidiosis in lambs, calves, and poultry, insecticides, anthelmintics), **1214**, **1364** (tick dips).

HYGIENE, PUBLIC HEALTH AND VETERINARY SERVICES

Barron, J. L. (1944). **Philosophy and future of milk control.**—*Amer. J. publ. Hlth.* **34.** 467–472. [Discussion by A. W. Fuchs, pp. 472–476]. **1344**

B. points out that the milk hygiene regulations in the U.S.A. have developed haphazardly and illogically. Local prejudice, vested interests, and insularity led to the present wide variation in the degree of milk control. He gives a brief history of the development of the present regulations (with special reference to New York City) and points out the value of the standard milk ordinance of the U.S. Public Health Service (1924) and its amendments in suggesting a uniform minimum of milk sanitation. He argues that the present system of local and municipal responsibility is unsatisfactory and that it leads to too many anomalies. He suggests that milk control should be the responsibility of the state, with inter-state co-operation for the removal of the present artificial barriers to the transport of milk.

In the discussion, Fuchs points out the degree to which the standard milk ordinance has already been voluntarily adopted. This ordinance, although promoting uniformity, has yet sufficient flexibility to permit individualism in the policies of different states. He stresses the value of farm inspection, apart from laboratory examination of the milk, in the production of clean and safe milk.—R. M. Arnold.

Cone, J. F. (1944). **The effect of machine milking upon the leucocyte count and the chloride content of milk.**—*J. Dairy Sci.* **27.** 215–224. **1345**

Quarter samples of milk from 31 cows were taken at intervals of 2–4 weeks over a period during which the method of milking was changed for each animal from hand milking to machine milking or *vice versa*. In most cases data were collected for an entire lactation under each method.

Details of the methods of examination are given, and results tabulated for a comparison of the leucocyte counts and chloride content of milk samples from the same cow at the same stage of lactation when milked by hand and by machine. Samples from quarters with and without mastitis showed a significantly higher leucocyte count and chloride content when machine milked than when hand milked. There was a steady rise in figures for both tests in uninfected quarters towards the end of the lactation period, but this was less marked in the infected quarters where the values were already higher than normal.

During the course of the experiment, 23 fresh infections with streptococci were detected, nine of which occurred in cows while they were being hand milked and 14 in cows being machine milked. These numbers are not considered statistically significant. Infection with *Pseudomonas aeruginosa*, however, occurred much more frequently with machine milking, only one out of 30 fresh infections originating in a hand-milked animal.

Dahlberg (1941) is quoted to show that the irritant effect of machine milking on the udder is markedly reduced when the machines are never left on longer than 4–5 min. It is suggested that if this practice had been followed the difference between hand and machine milking might have been less marked.—C. M. Ford

Cilli, V. (1943). Segnalazione di "Brucella Melitensis" in un campione di formaggio dell'Eritrea. [*Brucella melitensis* **in cheese in Eritrea**].—*Boll. Soc. ital. Med. Ig. trop.* (*Sez. Eritrea*), *Asmara.* **2.** No. 1. 28–37. [English summary]. **1346**

The author isolated *Br. melitensis* from cheese, in a cheese-making district in Eritrea.—H. I. Field.

—. (1943). **Discussion on post-war developments in the veterinary profession in South Africa.** [Speakers:—du Toit, Mönnig, Keppel, Snyman, Fourie, van Heerden, Alexander, de Kock, Bekker, Boswell, Quin, Clark, Horwitz, Bisschop, Steyn, H. P., Frean & Coles.]—*J. S. Afr. vet. med. Ass.* **14.** 148–153. **1347**

At the annual meeting of the South African Veterinary Medical Association members discussed the direction which future developments should take. The present State Service was inadequate to deal with the whole problem of animal health ; private practice seem-

ed likely to remain restricted to the larger towns and an increase in the number of field officers was necessary. The areas covered by these officers should be smaller, and in small towns, municipal work and a certain amount of private practice could be undertaken. State schemes for the eradication of tuberculosis, bovine contagious abortion and bovine mastitis should be undertaken at the earliest possible moment. Some speakers emphasized the necessity for the veterinarian to take more interest in general production, veldt preservation and animal nutrition. The suggestion was made that small diagnostic laboratories with a certain amount of surgical equipment should be established at different centres; these could act as vaccine-distributing centres as well. Post-graduate courses with, among other subjects, training in municipal work, should be instituted and the present five-year undergraduate course should be extended to at least five and a half years to include more animal husbandry.—E. M. ROBINSON (S. AFRICA).

—. (1944). **Reclassification for federal veterinarians.**—*N. Amer. Vet.* **25.** 450 & 452. **1348**

On June 19th, 1944, the U.S.A. House of Representatives passed an amendment to the Department of Agriculture Appropriation Bill which provided funds for increasing the salaries of employees in the Bureau of Animal Industry and the Meat Inspection Service. This enabled the Department of Agriculture to pay higher salaries to veterinarians as provided by the Classification Act. This act, which was passed by Congress several years ago, allowed for the advancement of employees after acquiring experience, but until now, in the absence of funds, the authorized promotions could not be made.—D. D. OGILVIE.

STENIUS. (1943). Finland. Veterinärväsendet i Finland 100 år. **[100 years' veterinary work in Finland].**—*Skand. VetTidskr.* **33.** 630–634. **1349**

Official veterinary activity began in 1720, the earliest date in Finnish history of the record of Government action to control livestock diseases. Regulations were enacted and more were added in 1745, 1746, 1749 and 1750. These remained in force until 1864. All this work, however, was handled by medical men, who sought veterinary advice from Sweden. The first teaching post to take cognizance of veterinary matters was the professional chair of natural history at Åbo university in 1786, but this lapsed in 1811.

From about this date the Medical Board of Health, which was responsible for the work, had considerable trouble with livestock diseases and in 1829 a teaching post was created to deal solely with them. The first to be appointed to this post was M. J. LINDFORSS, a medical man, who pursued interests other than veterinary medicine; another method of developing veterinary medicine was therefore chosen, namely that of sending selected candidates abroad for veterinary medical training. This took effect in 1838, when three men were sent for study to Stockholm. The first graduation took place in 1843. From 1843, an examination of such students was held in Finland before their appointment as State veterinarians and from that time the country was gradually provided with provincial veterinary surgeons who, however, worked directly under the Medical Board of Health until 1897, when a veterinarian, O. J. v. HELLENS, who also held a medical qualification, was appointed to take charge of all veterinary work in Finland.

From that time, development was rapid. In 1904 a veterinary assessor service was founded and in the same year a new order on livestock desease control was introduced and an energetic start was made to control bovine TB. Communal and municipal veterinary posts were created, and the district veterinary services were reorganized in 1906. The State Veterinary Laboratory was founded in 1908. The war of 1914–18 caused delay in further development, but a new start was made in 1919 when R. HINDERSSON was appointed to the principal veterinary office, being succeeded in 1921 by V. KANKAANPÄÄ. In 1930 the veterinary service was separated from the Medical Board of Health and became the veterinary department of the Ministry of Agriculture. Since then veterinary work has steadily progressed in the fields of disease control and milk hygiene. Finland, however, still has no veterinary school, and even up to 1939, students were sent abroad for training.

The first military veterinary work was organized in 1890 but came to an end in 1902 with the dissolution of the Army. In 1918, it was revived again and has continued up to the present time.

On the occasion of the 100-year jubilee of the veterinary profession in Finland a festival was held on October 1st, 1943; a description of this festival is given.—J. E.

See also abstr. **1145** (mastitis and public health), **1180–1186** (rabies), **1220** (trichinosis).

TECHNIQUE AND APPARATUS

LEVINE, M., & STOCK, A. H. (1944). **Preparation of culture media in the field.**—*Bull. U.S. Army med. Dep.* No. 78. 103–111. **1350**

The authors describe methods of preparing crude basal tryptic and peptic digest media in the field, where no commercial peptone may be available, using respectively the pancreas and stomach from the pig or other animal, together with minced meat or heart (or in their absence canned meat or hash). Such digests contain about 12–15% solids. A dilution of 1 : 10 or 1 : 12 gives a sufficient concentration of nutrients for the growth of the common intestinal pathogens, and a dilution of 1 : 5 or 1 : 6 is sufficient for the pathogens of the respiratory tract. Formulae are given for the preparation of nutrient broth, blood agar, Russel double sugar agar, eosin methylene-blue agar and carbohydrate media from these basal media. The type of growth obtained with various organisms on the different media is described. When muscle or heart was used as the substrate for digestion, the addition, as a buffer, of 0·1% Na_2HPO_4 or K_2HPO_4 to pancreatic or gastric mucosa digests, eliminated false acid reactions in carbohydrate media, but did not interfere with the detection of acid production from added carbohydrate.—H. I. FIELD.

SWIFT, H. F., WILSON, A. T., & LANCEFIELD, R. C. (1943). **Typing group A hemolytic streptococci by M precipitin reactions in capillary pipettes.**—*J. exp. Med.* **78.** 127–133. **1351**

A method is described for performing type-specific anti-M precipitin tests on group A haemolytic streptococci in 1 mm. capillary pipettes. With this method 250 tests can be made with 1 ml. serum, and it has given good results in the hands of the authors. A description is given of the apparatus, accompanied by illustrations and the methods of preparation of the bacterial extracts and precipitating serum used are described.

The method does not supply information concerning the T antigens of group A streptococci and is entirely dependent on the M antigen-antibody reaction.—D. A. MACPHERSON.

BERGER, F. M. (1945). **Preparation of purified penicillin.**—*Brit. med. J.* Jan. 27th. 116–117. **1352**

To obtain penicillin, the culture fluid of *Penicillium notatum* was adjusted with 20% phosphoric acid, to pH 6·4. It was cooled in the refrigerator and 40% of ammonium sulphate was added to precipitate impurities. After filtering in the refrigerator, five volumes of the filtrate were extracted with one volume of butyl alcohol. To the butyl alcohol extract an equal volume of light petroleum ether, and one-eighth of the total volume of a 2% sodium bicarbonate solution were added. The penicillin was obtained as the aqueous solution of the sodium salt. At a temperature of 4°C., the pH of the solution was adjusted to 3·6 with 20% phosphoric acid. 40% of ammonium sulphate was dissolved in the acidified penicillin solution, which was then extracted with an equal volume of chloroform. After separating, ten volumes of the chloroform extract were shaken with one volume of 2% sodium bicarbonate solution. The aqueous solution of penicillin was then adjusted to approximately pH 6·6 with dilute phosphoric acid, and sterilized by filtration. Such extracts were used clinically. They were effective and did not produce any ill-effects on intramuscular injection.—E.B.

KING, L. S. (1941). **The impregnation of neurofibrils.**—*Yale J. Biol. Med.* **14.** 59–68. [Author's summary copied *verbatim*]. **1353**

Brain tissue, fixed in 10 per cent formalin, and subjected to the action of silver carbonate, exhibits varying degrees of argyrophilia of its constituents. These may be graded in descending order beginning with the most argyrophilic : nuclear material, bare outlines of nerve cells, certain pigments, numerous axis cylinders, outlines of dendritic processes of neurones, and endofibrils of the apical and basal dendrites. Endofibrils of the cell body and perinuclear region, and the finer axis cylinder cannot be brought out merely by the use of silver carbonate, but require a sensitizing preliminary bath, as of silver nitrate. Such fibrils are consequently considered the least argyrophilic in the nervous system. There appears to be a difference in reactivity, and presumably of constitution, between endofibrils of the dendrites and those of the cell body. Size of the neurone, and hence of the neurofibrillar mass, is one of the determining factors governing ease of impregnation.

Treatment of brain tissue by direct heating in silver carbonate without preliminary mordanting or subsequent reduction gives a very complete impregnation of senile plaques and Alzheimer strands. These structures may be called hyperargyrophilic because they react more vigorously with silver than do normal constituents. This method is proposed as a critical test of true hyperargyrophilia in the nervous system.

Various types of staining artefacts are considered and briefly discussed. The artificial nature of some of the " pathological " changes described in the literature is mentioned.

See also absts. **1365** (culture media for pullorum disease antigen and for tuberculin), **1168** (staining of plasmodia), **1371** (statistical methods for research workers).

MISCELLANEOUS

I. —. (1944). **Great Britain. Ministry of Health. Department of Health for Scotland. Report of the Inter-Departmental Committee on Medical Schools.** pp. 312. London : H.M. Stat. Off. [8vo] [4s. 6d.] **1354**

II. —. (1944). **Reform of medical education.**—*Brit. med. J.* July 22. 117–118. **1355**

III. —. (1944). **Future of medical education.**—*Lancet.* **247.** 113–114. **1356**

I. This report presents an extensive survey of existing facilities for medical education in Great Britain, with numerous recommendations for the future. It is divided into three main parts, Part I (16 chapters) dealing with Undergraduate Medical Education, Part II (chapters 17–21) with Post-Graduate Medical Education and Research, and Part III (chapter 22) with Financial Considerations. Some of its major recommendations are as follows.

The medical school should be a faculty college or school of the university with adequate facilities for clinical instruction in hospitals. The governing bodies of the schools and hospitals should remain separate but their work should be co-ordinated. Three extramural schools in Scotland should be closed ; it is considered that certain London hospitals should move, in accordance with the redistribution of population.

No new medical schools should be created. Oxford should provide clinical training, but Cambridge is considered unsuitable for clinical teaching and should develop post-graduate departments.

Universities and medical schools should be represented on central and local bodies dealing with National Health Services.

There should be more and better paid teachers. Elementary physics, chemistry, and biology should be taught as part of the general school education and the standard of entry to the medical course should be midway between the principal and subsidiary subjects of the Higher Schools Certificate.

The undergraduate course should last 4½ years, of which the first two should be preclinical, and the examinations should be conducted solely by the university. Before registration, satisfactory completion of a further year in a house appointment would be necessary.

Specialists and consultants should be required to have a further five-years' training, in certain paid appointments, after registration.

The only ultimately satisfactory post-graduate training for the general practitioner is suitable clinical assistantship. Refresher courses, meanwhile, will be necessary and they should be held in institutions other than those giving undergraduate education.

II. A summary of some of the major recommendations of the " Goodenough Report " [see I]. It is commented that :—

" The present arrangements for medical education may be likened to a neglected garden, and these proposals to the plans of the gardener to remove weeds and dead wood and encourage growth where it promises to be productive. Two chief obstacles lie in the way. The first is the expense. The second obstacle is the men ".

There will be a shortage of trained teachers and it is essential that more junior teaching and research appointments should be made as soon as possible.

III. This article is similar in general terms to II.
—H. E. BYWATER.

ROBERTS, F. (1944). **" Having your likeness taken ". Observation in the student's training.**—*Brit. med. J.* August 26th. 284–286. **1357**

R. deplores the fact that the powers of observation of the average medical graduate are relatively undeveloped and suggests that three factors are responsible for

this, *viz*, the method of teaching, laboratory methods of diagnosis, and the text-books. He suggests that the present method of clinical teaching may lead many students to aquire an inferiority complex. The taking of clinical notes, he states, is rightly regarded as important, but it may be dangerous since notes may be written automatically, without the facts being impressed upon the memory. A student may also acquire the habit of recording observations in a way which, while not entirely accurate, does not leave him open to criticism.

Laboratory methods are blamed for an atrophy of the senses, since many adopt the use of these aids as a substitute for clinical observation rather than as an additional aid. The standard text-books used in the preclinical and clinical periods of the course, have increased by over 1,000 pages in each case since the period 1907–12. This increase adds considerably to the mental burden of the student. R. suggests that the large books should be used only for purposes of reference and that the aquisition of large masses of factual knowledge dulls the imagination and deadens the curiosity and initiative of the student.

As a solution to the problem, R. suggests a complete revolution in clinical medical training, so as to stimulate the student's interest and develop his powers of observation. He suggests that the student should be put through a rigorous discipline in accurate observation and in giving an account of his observations without the aid of notes. With emphasis laid on observation, the student would learn to see laboratory methods in their proper perspective as aids to clinical diagnosis. After days spent in the clinic the student should, apart from reasonable time spent in recreation, spend his time in broadening his mind by general literature, nature, or art and by taking an active part in some form of social service. The proper place of the large text-books is in the hospital library and the student should only use them for reference ; for ordinary purposes the student needs only small handbooks which he should know thoroughly. R. suggests that the system of examination should be altered so that the harmful superficial reading of the large text-books is rendered unprofitable and he considers that the student should only acquire these books when he is qualified and should then read them critically, being prepared to find his own observations contradictory to them in some particulars.—T. E. G.

—. (1944). **Nuffield College. Problems of scientific and industrial research. A statement.** pp. 63. London : Humphrey Milford, Oxford University Press. [8vo] [2s.] **1358**

This statement was prepared following conferences held under the auspices of Nuffield College, Oxford. The 92 signatories include many prominent scientists, industrialists, economists, and public men.

The general theme of the statement is the urgent necessity for a great increase in scientific and industrial research in Great Britain. The theme is developed by discussing relevant aspects of the problems involved, including such considerations as how much should be spent on research, the present waste of potential research ability, the necessity for fundamental research to be undertaken in industry, the need for closer contact and interchange of personnel between industry and the universities, the desirability of a high status for science in industry, and the over-riding need for freedom in academic research wherever it may be carried out.

The increasing usefulness of biological science in the service of agriculture and public health is emphasized, and a special plea is made for the development of teaching facilities and expansion of equipment for all types of biological studies.—D. D. Ogilvie.

—. (1944). Republica Argentina. Almanaque del Ministerio de Agricultura de la Nacion, 1944. **[Yearbook of the Ministry of Agriculture, Argentina, 1944].** pp. 447. Buenos Aires : Direccion de Informaciones. [8vo]. **1359**

This handbook contains many articles and tables of miscellaneous information of interest to the agriculturist. The subjects dealt with include, among others, general and specialized agriculture, animal and poultry husbandry, milk production, entomology, agricultural chemistry, and meteorology.

Articles of veterinary interest relate to anthrax, " poll-evil " and fistulous withers, affections of the hock joint, foot and mouth disease and many other conditions of domesticated animals and birds.—I. W. B.

—. (1943). **Agricultural production in Continental Europe during the 1914-18 war and the reconstruction period.** pp. 122. Geneva : League of Nations. [4to]. **1360**

This publication brings together in convenient form the existing data on the production, trade and consumption of the major foodstuffs during the war and the early post-war periods, in the regions most affected by the 1914–1918 war. The data are analysed to elucidate the causes of the decline in production in continental Europe between 1913 and 1919, and to determine the factors retarding agricultural recovery after the war. The greater part of the publication deals with the cereals ; the production of cereals and potatoes fell sharply during the war and remained low during the early post-war years. The cattle population was reduced by about 10% in most of France, Switzerland, the Netherlands and Germany ; in the battlefield areas the decline exceeded 20%. Losses in the battlefield areas were made good by about 1924, but elsewhere recovery was relatively slow, the reconstruction of cattle herds by natural growth being necessarily a lengthy process. The number of pigs declined by 30–80%, but recovery was rapid. During the war sheep increased in number in Western and Southern Germany and in Switzerland but decreased elsewhere in Europe. In the belligerent countries the number of horses declined by 10–30%. The causes and effects of the changes in the numbers of livestock are discussed, with particular reference to cattle. Certain deductions on the recovery of agricultural production after the present war are made in the light of the data available from the period under consideration. It is concluded that fundamentally, the agricultural position of Europe is weaker at present than it was at the end of the last war. The decline in the number of livestock during the present conflict is probably greater, and this problem, which was perhaps the least difficult last time, is likely to prove the most serious of those facing European agriculture after the present war.—N. J. Scorgie.

Tempany, H. A., Roddan, G. M., & Lord, L. (1944). **Soil erosion and soil conservation in the Colonial Empire.**—*Empire J. exp. Agric.* **12.** 121–153. **1361**

It is said that the most widely prevalent form of erosion in colonial territories is sheet erosion, but extensive gullying also occurs, whilst in drier areas wind erosion is a serious menace. The chief contributory causes have been excessive deforestation, cultivation of lands with a steep slope, unsuitable methods of cultivation, lack of provision for dealing with surplus run-off, the growth of crops conducive to erosion without adequate cultural safeguards, lack of protection from wind, and excessive concentrations of livestock, especially during dry periods, leading to overtrampling and consequent soil loss. In most colonies preventive and remedial measures are undertaken by the agricultural, forestry, veterinary, geological and public works departments in co-operation with each other and with

the administration. The measures adopted comprise contour ploughing and planting, rotational strip cropping, the use of grass strips and live wash-stops, the making of contour drains, the planting of wind-breaks, restriction of crops conducive to erosion, the use of cover crops, the control of grass-burning, and the improvement of pastures, combined with the introduction of rotational grazing and where necessary the reduction of stock, the establishment of forest reserves, particularly on steeply sloping ground, the construction of contour terraces and bunds, the construction of works to deal with surplus run-off and the maintenance of roadside drainage. With this is combined the provision of additional water-supplies for livestock and human consumption, thereby reducing excessive concentration of livestock during dry seasons.

As regards the influence of livestock on soil erosion, the value of mixed farming in the maintenance of soil fertility is emphasized. When an excessive livestock population is carried it usually results in deforestation, and the evils this may cause are well illustrated by the problem of providing kraal manure for humus in certain eroded areas of Basutoland, where, in the absence of wood, kraal manure was in use as fuel.

In most of the colonies provision has been made for additional water supplies to prevent excessive concentration of stock in dry seasons, and in some, *e.g.* Tanganyika, special dry-season grazing areas are reserved. In Uganda the organization of stock markets following successful disease control has succeeded in reducing stock concentrations in dangerous areas, and has led to a marked increase in meat consumption with benefit to African nutrition. Sales rose from 42,431 cattle in 1938 to 130,048 in 1942. Stall feeding for manure-making purposes is being encouraged in thickly populated areas, with controlled grazing of resting strips and communal pastures. In Tanganyika the sale of surplus cattle is also being encouraged, and has now reached 250,000 head per annum, and the reclamation of tsetse areas is opening up new areas for human and livestock expansion. Grass burning favours erosion as it removes the soil protection, and in Nyasaland early controlled burning has been adopted, so that some renewal of growth may have occurred before the onset of the rains.

In Swaziland concentration of cattle round dipping tanks has been blamed for erosion in some areas, and an additional 50 dipping tanks are to be built to encourage dispersion.

In Cyprus steps have been taken to curtail the grazing of goats and other livestock in forest areas, and in Palestine the High Commissioner has powers to declare regions threatened by erosion to be special areas in which cultivation of crops, the pasturing and passage of domestic animals, and the cutting and removal of vegetation may be regulated or prohibited.

In other areas, though erosion has in many places become a grave problem, for example the West Indies, stock do not appear to be involved to any large extent, and mainly come into the picture in view of the value of mixed farming in soil maintenance.—U. F. R.

—. (1944). **Alternate husbandry.**—*Joint Publ. Imp. agric. Bureaux.* No. 6. pp. 156. [4to] [5s.] **1362**

The subject matter of this publication is divided into nine chapters, each written by a specialist author ; the tenth chapter consists of bibliography. The first chapter is entitled " Trends in different countries and regions " and shows how far alternate husbandry has been adopted in different countries and the way in which it is developing. The second chapter deals with the influence of herbage rotations on the physical properties of the soil, and the third, entitled " The roots of herbage plants ", deals in particular with the characters and behaviour of the roots in the legume-grass association. The fourth chapter deals with the types of ley suited to different environmental conditions and for different objectives. The fifth chapter, entitled " The animal crop in relation to alternate husbandry ", is of especial interest to the veterinarian and stresses that the extent to which the animal crop can be developed, depends upon the physiological characters of the stock themselves, and upon their differential responses to and requirements from the local environment. The next chapter deals with soil fertility and the types required by particular crops grown in rotation. The seventh chapter treats of alternate husbandry and current agricultural problems, including soil conservation, weed control and crop health. Chapter eight is entitled " Alternate husbandry and animal disease " and deals chiefly with the effect of alternate husbandry on parasitic diseases. Parasitic gastritis is dealt with in detail and more briefly treated are lungworm disease, tapeworms and ticks, whilst in a short section consideration is given to the effect of ley farming on the incidence of bacterial diseases. Chapter nine deals with the economic factors involved in the change to alternate husbandry.

—T. E. Gibson.

REPORTS

Northern Ireland (1944). **Agricultural Research Institute of Northern Ireland, Hillsborough, Co. Down. Seventeenth Annual Report, 1943-44.** pp. 35. Items of veterinary interest pp. 13–14 & 17–32. Hillsborough : The Institute. [8vo]. **1363**

A large-scale experiment was conducted during 1943 to determine the possibility of controlling Summer Mastitis by injections of *Corynebacterium pyogenes* toxoid. The results, though encouraging, were not conclusive.

In experimental flocks during the 1944 season " Six-Day Chick Disease " caused serious losses. Up to 50% of all chicks hatched succumbed to it. Treatment with a sulphonamide [no details] or marmite during the first week of life had no beneficial effect.

Following demonstration of the value of dried liver meal as a source of riboflavin for chicks, the regulations governing the compounding of chick-rearing mashes were amended so as to include this material among the riboflavin-rich substances whose inclusion is obligatory. Further detailed observations on this subject have shown that the riboflavin requirement of White Wyandotte chicks for optimum growth up to six weeks of age is 3 mg. per g. of food, but that the requirement for complete prevention of Curled-Toe Paralysis is greater than this. Previous experiments have indicated that the feeding of high levels of potato meal resulted in progressively poorer growth rates and pathological symptoms in chicks. Further experiments and brain examinations have shown that Nutritional Encephalomalacia (vitamin E deficiency) is involved. Clinically, the condition is known as " crazy chick " disease [see Asplin—*V. B.* **11.** 791]. For adult poultry, it is suggested that dried potato products may be valuable and may replace 40% of cereals in the mash.—D. D. Ogilvie.

Union of South Africa. (1943) **New conditions and**

the agricultural industry. Report of the Department of Agriculture and Forestry and Food Control Organization for the year ended 31 August, 1942. [VILJOEN, P. R.]—*Fmg S. Afr.* **18.** 1–45, 56 & 79–100. [Items of veterinary interest pp. 95–98]. **1364**

In Northern Natal a severe outbreak of EAST COAST FEVER on a large scale occurred. In the rest of the Union very few outbreaks occurred.

The most important achievement of the year in the study of stock diseases was the success of the work on the control of the BLOWFLY pest. In the summer months the large bluebottle *Chrysomyia marginale* competes very strongly with the sheep blowfly [*Lucilia sericata*] in carcasses. It was recommended therefore to destroy carcasses during the winter and in the summer to use " blowfly remedy " on the wool of sheep that may be fly struck.

There was an unexpected increase in the number of TSETSE FLIES in the Umfolozi area of Zululand and in consequence there was an extension to neighbouring farms outside the Reserve.

In combating the arsenic-resistant blue tick, *Boophilus decoloratus*, in the East London area it was found that an arsenic-nicotine dip (0·16% arsenic plus 0·04% nicotine) with dipping at 7-day intervals yielded the best results. At the same time tests were also carried out with a view to determining the extent to which farmers could make use of scrap tobacco for securing the necessary nicotine.—E. M. R. (S. AFRICA).

U.S.A. (1942). **United States Department of Agriculture, Agricultural Research Administration. Report of the Chief of the Bureau of Animal Industry, 1942.** [MOHLER, J. R.] pp. 46. Washington, D.C. : Superintendent of Documents. [8vo] [10 cents]. **1365**

A development in connexion with departmental reorganization was the establishment of an Agricultural Research Administration in which the Bureau of Animal Industry was grouped with other bureaux having related interests [see *V. B.* **13.** 344, abst. 2307].

Active support of the nation's wartime programme involved intensified research on meat, wool, eggs, etc., and technical assistance to war agencies. Research on dehydration of meat produced, within a month of the commencement of the work, the product " dehydrated beef ". Meanwhile research was being continued on methods of packing and of improving the dried meat products.

Most of the communicable diseases of food animals were under control, and campaigns for the eradication of several of the more dangerous maladies were well advanced. CATTLE TICK eradication was 99% complete, BOVINE TUBERCULOSIS was in the " mopping-up " stage, and excellent progress was made against BOVINE BRUCELLOSIS.

The bureau had 4,601 full-time employees at the end of the year, exclusive of 302 on military service. Veterinarians made up 91% of the 1,879 professional and scientific employees. There were also 336 veterinarians in the field service and 111 others were employed intermittently.

The 10 veterinary colleges in the U.S.A. were accredited by the Department of Agriculture and the Civil Service Commission: 2,509 students were enrolled and 555 veterinarians qualified. Seventeen foreign veterinary colleges were recognized.

ANIMAL DISEASE STATION [EICHHORN, A.]—The effect of drug treatment for BOVINE MASTITIS was tried on streptococcus-infected udders of 166 cows in six herds totalling 485 cows. In lactating quarters, acriflavine was 89·3% efficient, entozon 60%, colloidal silver oxide 71·4%, and tyrothricin 51·4%. In dry quarters, acriflavine was 71·4% efficient, entozon 71·4%, colloidal silver oxide 69·9%, and tyrothricin 91·1%. Although the infection could be eliminated from many quarters, a small percentage continued to produce abnormal milk or ceased to function. Extensively infected quarters did not respond satisfactorily to treatment. When staphylococci were also present, they persisted after successful treatment of the streptococcal infection.

An experiment of several years' duration has proved that pigs in close contact with infected chickens contract TUBERCULOSIS. When the poultry were removed, and infected pigs were removed yearly, TB. was eliminated from the piggery in two generations.

Resistance to BRUCELLOSIS persisted through at least five pregnancies in cows vaccinated as calves with strain 19 vaccine. The incidence of abortion in vaccinated animals was about 1·3%. Two scientists from the Station were seconded to the British Ministry of Agriculture and Fisheries to initiate a war emergency control plan based on vaccination alone in infected herds. The pathogenicity of brucella for sheep was tested. " Experiments concluded during the year show that sheep are markedly resistant to natural exposure to *Brucella abortus* and to *Br. melitensis*, the species causing brucellosis in goats. Exposure in both cases was severe. Although it was possible by radical artificial methods to induce both types of the disease in sheep, the infrequency of clinical manifestations in these animals indicates a high natural resistance. " [This result is surprising in view of the extensive infection of sheep with *Br. melitensis* in southern France (see TAYLOR *et al.*—*V. B.* **6.** 111).] Pregnant heifers also resisted infection when kept in close contact with *Br. melitensis*-infected goats. A study of SWINE BRUCELLOSIS was commenced. Preliminary results indicated that the boar is a prominent factor in spreading the disease. All commercial brucella vaccine is tested at the Station.

Serial passage of the infective agent of the AVIAN LEUCOSIS complex through chick embryos or chicks was found to increase its virulence. Complement-fixation tests showed a close relationship between neural and blood types of the disease, but the visceral (big liver) type was not very active in inducing complement-fixing antibodies. Immunization experiments had not given encouraging results.

Work was done on ARTIFICIAL INSEMINATION. Studies were made of the bacterial content of bull semen collected in an artificial vagina. Diphtheroid organisms predominated, staphylococci were frequent, and occasional colon bacilli and *Pseudomonas pyocyanea* were also found. Chick-embryo diluting fluid was found as good as egg-yolk fluid as a preservative for bull semen. It was proved possible to impregnate cows during a short while after the normal 14 hours' period when they will accept the bull.

ANIMAL HUSBANDRY AND ANIMAL NUTRITION DIVISIONS [MCPHEE, H. C., & ELLIS, N. R.]—Studies of the nutritional factors involved in controlling NECROTIC ENTERITIS in young pigs showed that absence of nicotinic acid from the ration decreased resistance to *Salmonella cholerae-suis* whilst its presence made pigs resistant. With horse and mule semen a satisfactory diluent was obtained by dissolving a ½ oz. gelatin capsule containing 5·78 g. glucose and 0·67 g. Rochelle salt in 100 ml. water and adding one egg yolk. With this diluent, semen could be diluted 1 : 10 for immediate use, and 1 : 3 was efficient when semen was stored 24–48 hours. Investigations with small animals discredited the idea that the use of an alkaline or acid vaginal douche before service has any effect on the sex of the offspring. Similar results were obtained in pigs when the semen was made acid or alkaline before INSEMINATION. Other investigations were carried out on the maintenance and reproduction of horses and mules, beef and dual purpose

cattle, sheep, goats swine and poultry. Work carried out on methods of preserving meat in palatable form is detailed.

20,247 animals were imported for breeding purposes; nearly 16,000 were cattle and of the total, 19,878 came from Canada.

FIELD INSPECTION DIVISION [FLADNESS, S. O.]—The eradication and control of disease included the inspection of nearly 15,000,000 and the dipping of about 1,236,000 sheep and cattle for scabies. Inspections of imported animals at the ports numbered 844,860, an increase of 35% on the 1941 figures. Exports were only 9,786 animals.

INTER-STATE INSPECTION DIVISION [MILLER, A. W.]—Very large numbers of animals were inspected, over 20,000,000 cattle, nearly 22,000,000 sheep, and over 29,000,000 pigs. Disease control measures included dipping or immunization, and the disinfection of animals, vehicles, buildings, etc.

MEAT INSPECTION DIVISION [JOSS, E. C.]—Inspections were carried out at 679 establishments, and over 86,000,000 animals were inspected before and after slaughter. Most of the 24,291 animals condemned were classed as "moribund", including animals found dead in the *ante-mortem* inspection pens. These and the 177,962 carcasses condemned represent a remarkably low rate of loss on the very large number of animals handled. Details are given of the various products inspected.

PATHOLOGICAL DIVISION [SCHOENING, H. W.]—ANTHRAX spores were still virulent on cotton swabs when kept at room temperature for four years, and in serum-broth culture kept at −5° to −10°C. for eight years. The recovery of a vaccine strain of *B. anthracis* from the muscles of a slaughtered bovine that had been recently inoculated shows the necessity of a delay of several weeks between inoculation and slaughter for food. Intradermal anthrax spore vaccines were being increasingly used in infected areas. In naturally acquired JOHNE'S DISEASE two types were observed. In type A, infection is generalized in the intestinal tract but localized in the mucosa. In type B, the organism is much more invasive, and affects mucous, submucous, muscular, and serosal coats. 75% of arthritis in pigs was found to be due to SWINE ERYSIPELAS. More than 276,000 pigs received simultaneous vaccination against S.E. The results were entirely satisfactory and the product was being prepared by commercial laboratories. Feeding a *Salmonella cholerae-suis* culture to normal pigs set up either an acute PARATYPHOID INFECTION causing septicaemia and death in 3–7 days, or a chronic form causing unthriftiness and often terminating in necrotic enteritis. Tests showed that it is not safe to inoculate pigs with swine fever serum and virus when they are carriers of *S. cholerae-suis* as severe losses may occur from the acute disease which results.

In bovine liver abscess, *Fusiformis necrophorus* infection was found, and ulcers in the rumen also often contained the organism.

"Further evidence that the marginal bodies in the red blood cells of cattle affected with ANAPLASMOSIS are the cause of the disease was obtained. Clear serum of blood from an affected animal after centrifugation at high speed did not produce the disease. The red blood cells containing anaplasms, after several washings in physiological saline solution, regularly produced the disease." *Argas persicus*, the fowl tick, had been found to transmit the disease.

Reports were received of 36,872 cases of EQUINE ENCEPHALOMYELITIS with 8,210 deaths in 34 states. Investigations carried out confirm that the horse is susceptible to St Louis encephalitis virus, but there is no immunological relationship with E.E. virus. There are indications that the virulent Eastern type of virus is spreading. *Stomoxys calcitrans* and *Tabanus sulcifrons* readily transmitted EQUINE INFECTIOUS ANAEMIA. The mosquito, *Psorophora columbiae*, was also found to transmit an inapparent form of the disease; a dose of 1·0 ml. of virulent filtered serum in a dilution of 1 : 100,000 caused this sub-clinical form of the disease. The disease is also caused by 0·001 ml. of infected blood. Further tests were carried out in the field on the value of crystal violet vaccine in SWINE FEVER control. 13,000 hogs were treated and of these 80% were adequately protected.

Experiments continued since 1939 on the role of heredity in transmitting PERIODIC OPHTHALMIA showed that only one of 21 colts born of affected parents contracted what appeared to be periodic ophthalmia; there was only a mild attack with no recurrence after 11 months. A strain of *Streptococcus genitalium* isolated from the genital tract of mares caused recurrent attacks suggestive of acute periodic ophthalmia in one of three rabbits inoculated [route not stated].

VITAMIN A DEFICIENCY was observed in fattening cattle which had been fed for 10 months or longer. Symptoms noted were increased respiratory rate, lameness, night blindness, nervousness, and sometimes convulsions. There were definite swellings of the subcutaneous tissues of the body and limbs. P.M. the swellings were found to be due to a sero-gelatinous exudate in the subcutaneous tissues, from which oozed a great deal of fluid. There were small haemorrhages in the myocardium and the capillaries and arterioles were thickened. There was a definite improvement when alfalfa hay was added to the ration.

In studies of stock-poisoning plants, it was found that *Reverchonia arenaria* (spurge) may cause death if fed when green for six days at 1 lb. per 100 lb. live weight. *Peganum harmala* was toxic to cattle and sheep when collected in May but not if collected in the autumn. *Glottidium vesicarium* fruits retained their toxicity at least six years. A horse given a single feed of 0·05 lb. per 100 lb. body weight died in 18 hours. *Senecio ambrosioides* (ragweed groundsel) was not toxic to a sheep fed 60 lb. of green leaves in eight days. *Astragalus cicer* was not toxic to a 600-lb. bovine fed 508 lb. of dry plant in 29 days.

Experiments on two sorghums (hegari and spur feterita) 10–18 in. high in pots, showed that subjecting these plants to freezing temperatures in a refrigerator may increase or decrease the hydrocyanic acid content, the effect of freezing being influenced by the variety of plant and the severity of freezing. On the day after freezing, the HCN content was highest in the morning and decreased rapidly during the day, the loss being greatest in plants subjected to the lowest temperature. A plant that increased in HCN content on freezing increased both in free or readily available HCN and in total potential HCN. Plants that survived freezing might increase in HCN during recovery.

No positive reactions were obtained in the 38 samples of blood serum submitted for test for GLANDERS. 905 blood serum samples of 79,013 tested were positive for DOURINE. Two cases of RABIES were diagnosed in dogs.

All commercial biological products are tested by the Bureau staff. 60% of all PULLORUM DISEASE stained antigen produced was made according to the new thiosulphate and glycerol culture formula. It was found experimentally that the thiosulphate could be replaced by sulphur in the medium. Large quantities of mammalian and avian tuberculin were issued for field use. Asparagine, which is difficult to obtain, had been replaced by ammonium malate in culture medium for tuberculin production; yields and final values of these cultures

closely approximated to those in which asparagine was used.

Division of Tick Eradication and Special Diseases [MacKellar, W. M.]—Over 10 million animals were dipped in controlling and eradicating ticks in the southern states and Puerto Rico.

Field investigations were made on the value of the serum-culture method which was being tested by the Pathological Division as a means of prophylaxis of Swine Erysipelas. 710,308 pigs were treated by this method, and 8,575 pigs were immunized against Swine Fever with crystal violet vaccine

Tuberculosis Eradication Division [Wight, A. E.]—Nearly 11 million tuberculin tests were made. Reactors were 0·26% only, the lowest since the campaign commenced in 1917. The total expenditure was $4,708,000. The average appraised value of reactors was $109·69, the average Federal payment $16.55 and the average State payment $21.49. The owner also received the salvage value, which averaged $50.35. Of the reactors on which Federal payment was made, 7% were registered pure-bred cattle. 63,073,213 cattle were under supervision for TB. eradication. There were 12,230 veterinarians on the approved list for tuberculin testing of cattle for interstate shipment. 11 reactors were found among 246,677 cattle so tested. A summary of official tuberculin testing shows that the percentage of reactors has progressively declined from 2·0% in 1933 to 0·26% in 1942.

Johne's Disease was found to exist to a slight degree in 12 states. Tests with johnin or avian tuberculin showed that 437 cattle (8·4% of those tested) were infected.

The survey of farm poultry was continued. Of 87,000 flocks examined containing 11,738,000 fowl in 10 states, 4,513 flocks were infected with Tuberculosis. In addition, 18 Bureau veterinarians were assigned to the eradication of Avian TB. in the midwestern and north central states, where the disease is most prevalent. Among 303,641 fowls tuberculin tested, 2·8% were found infected.

Control and eradication work on Bovine Brucellosis, which is voluntary as far as the Federal Government is concerned, was continued. Of 6,891,219 cattle tested, 3% reacted to the agglutination test. This included 39,586 reactors in calfhood-vaccinated herds, for which Federal indemnity is not paid. The antigen used is supplied by the Animal Disease Station of the Bureau. For reactors slaughtered, the owner received a state and a Federal payment of indemnity, except in California, Colorado, Indiana, Massachusetts, Nevada, Oklahoma, and Texas, where no provision is made for state payment. The average amount paid was $85.60, which included salvage $52.06, Federal payment $15.83, and state payment $17.71. Of the reactors, 9% were pure-bred cattle. The field study of calfhood vaccination with vaccine prepared at the Animal Disease Station was concluded at the end of 1941. The results indicated that the method was very helpful in badly infected herds. This method of control was being carried out in 37 states, and since the beginning of 1941, 140,000 calves had been vaccinated.

Division of Virus-Serum Control [Skidmore, D. I.]—This division controls the manufacture of biological products, as well as biological products and organisms or vectors imported or exported.

There were 39 producers of Swine Fever antiserum and virus.

Zoological Division [Schwartz, B.]—Considerable attention was given to problems in parasitology and parasite control associated with the war effort.

In Bovine Trichomoniasis the best period for making a diagnosis is during the third week after coitus; less recent infections, particularly if primary, can best be detected 2–7 days before oestrus. Infection in bulls appears to depend on individual susceptibility [see Hammond & Bartlett—*V.B.* **14.** 84]. *Trichomonas gallinarum*, which infects the lower digestive tract of turkeys, was transmitted from infected to healthy turkeys in contact. Infected turkeys made smaller weight gains than those free from the infection. In Coccidiosis of lambs and calves, sulphaguanidine proved valuable as a preventive but its cost makes its use prohibitive. Flowers of sulphur, in low percentage in the food, had a distinct value for lambs, although less than that of sulphaguanidine. In calves the parasites mentioned are *Eimeria bovis* and *E. alabamensis*. The feeding of several hundred chicks with 1–2% sulphaguanidine in the mash protected them from Caecal Coccidiosis, and among 115 infected birds so treated there was no mortality, whereas 39% of the infected controls died. Chicks fed a mash containing 0·5% sulphaguanidine and given repeated small doses of coccidia, at intervals of 1–5 days for 15 days, developed a definite immunity to large doses of coccidia. In Anaplasmosis transmission experiments on four susceptible animals, *Tabanus sulcifrons*, and the sucking louse, *Linognathus vituli*, failed to transmit the disease over a period of six months.

In dealing with Ox Warbles, experiments were continued with a wash containing 1 oz. derris powder or cubé powder and ½ oz. of a "hymolosalt" (in place of soap) per gal. of water. Variations noted in the efficiency of the wash were: in Colorado 91–97%, in New Mexico 75–80%, and in Texas 37–52%; these variations have not been explained. In Colorado a wash containing 1·6 oz. derris or cubé per gal. without "hymolosalt" destroyed 98% of the grubs. Cattle must be kept in the dip for 2 min. Scrubbing the backs with long-handled brooms only slightly improves the effectiveness. Sheep infested with *Melophagus ovinus*, the sheep ked, were dipped in a wash consisting of 4 oz. of derris powder, containing 5% rotenone, per 100 gal. of water. The dipped sheep remained free from keds in an observed period of 92 days, during which they were mingled with infested sheep.

Liver Fluke was found to infest 42% of adult cattle, 7·5% of calves, and nearly all sheep near Angleton, Texas. Treatment experimentally with hexachlorethane, in doses of 80–100 g. per animal, removed all flukes from 40 of 47 cattle. The drug appeared to be non-toxic in all except debilitated animals.

Investigations showed that *Strongyloides ransomi*, the intestinal threadworm of pigs, is probably an unrecognized cause of death in young pigs. Infestation is caused by frequent contact with straw or other bedding contaminated with infected faeces. Pigs that die of the infestation have the larvae in the myocardium, the skeletal, tongue and oesophageal muscles, lungs, tonsils, and sometimes the brain. Petechial haemorrhages in the heart and severe pericarditis are seen P.M. It was observed that infective larvae on the pastures die in about a month. Even at temperatures of 32°–78°F. the eggs soon lose their vitality. Young pigs on pastures will not therefore usually become heavily infested, but if kept with older pigs around straw stacks or infected bedding etc., they may become seriously infested. Pigs farrowed on infected pastures may become infested with threadworms and with nodular worms, kidney worms, and coccidia within a few hours after birth. Non-specific reactions of pigs to Trichina antigen were investigated, and it appears that they may be due to the diluents usually used for the antigen [the nature of these diluents is not mentioned]. Trichina-free garbage-fed pigs gave a higher proportion of nonspecific reactions than did those which were fed on grain. Examination

of 450 rats trapped in packing houses in Chicago showed that 10% were infested with trichinae, while 1% of mice were infested.

Capillaria caudinflata, a parasite of chickens, was found to infect turkeys. Experimental infections occurred when turkeys and chickens were fed earthworms from poultry yards where infected birds were present; the earthworms appear to be the intermediate hosts of this parasite. A high protein diet appeared to give some protection to birds infested with helminths but a heavy mixed worm infection retarded growth of baby chicks whatever food was given.

Studies of the effects on sheep of *Oesophagostomum columbianum* showed that the damage done to the host depends on the extent of the infestation. The intestines of heavily parasitized lambs were dotted with nodules making them unfit for commercial use. Other effects were loss of appetite, anaemia, and diarrhoea. The infested sheep had inferior wool, discoloured and with weak or broken fibres. Studies showed that the eggs and infective larvae of stomach worms of sheep at Beltsville died rapidly on pastures in late summer and the early autumn. At the regional laboratory at Auburn, Alabama, it was found that feeding milk to calves had an adverse effect on the development of *Haemonchus contortus*. Lungworms were readily transmitted when infested and susceptible cattle were kept on the same pasture. Resting a pasture for six weeks during spring or autumn was apparently sufficient to rid it of infective lungworm larvae.

In a controlled experiment it was found that 2 g. phenothiazine daily for ten days in the feed of two horses was not toxic, reduced the parasite load, and prevented the development of the larvae that hatched from eggs in the faeces. In ten control horses, the parasite load increased and there was an increase in the numbers of eggs in the faeces from which infective larvae developed. It was found experimentally that a single full therapeutic dose of phenothiazine, given in the summer, was effective in keeping down the extent of the infestation during the winter months, and the pre-treatment worm burden was not reached until the following summer. For effective control, through elimination of infective larvae from the pastures, treatment with small doses in the feed daily for several weeks is of definite value as an adjunct to the full therapeutic dose.—J. A. G.

U.S.A. (1944). **Report of the Secretary of Agriculture, 1943.** pp. 252. Items of veterinary interest pp. 202, 208–210 & 214–215. Washington, D.C.: U.S. Govt. Printing Off. [8vo] [30 cents] **1366**

Annual losses in milk production in the U.S.A. due to BOVINE MASTITIS are estimated at 19 million dollars. More than 85% of the herds in the country and about 50% of the cows are infected. Trials at the Federal Research Center, Beltsville, with various sulphonamides have given promising results and are progressing.

Recent work has shown that some plant juices contain a substance (nature not disclosed) which, when injected into experimental animals, brings about sexual activity in the same way as do the pituitary hormones. Further work is proceeding to determine its value in BOVINE STERILITY.

The "Index-Catalogue of Medical and Veterinary Zoology", which has been developed by the Bureau of Animal Industry over many years, now lists about 100,000 parasites of man and animals in all parts of the world.—D. D. OGILVIE.

See also absts. **1234** (Kansas V.M.A. conference), **1359** (yearbook, Ministry of Agriculture, Argentina), **1225** (British Empire Cancer Campaign).

BOOK REVIEWS

COOLEY, R. A. [Senior Entomologist] & KOHLS, G. M. [Associate Entomologist]. (1944). **The Argasidae of North America, Central America and Cuba.**—*Amer. Midl. Nat. Monogr.* No. 1. pp. 152. Notre Dame, Indiana: The University Press. [8vo] **1367**

A detailed classification is given of the Argasidae of North and Central America, with a description of the morphological characters of the various species, and the methods of examination required for their identification. A brief note is given on their medical and veterinary importance, but this is not very complete, and while it is mentioned that *Argas persicus* may be a vector of fowl paralysis, its implication in the transmission of anaplasmosis is not referred to [see HOWELL *et al.*—*V.B.* **14.** 85]. The classification adopted divides the Argasidae into four genera:—*Argas*, with a definite suture line separating dorsal and ventral surfaces; *Otobius*, without the suture line, nymphs and adults dissimilar as regards integument, and with a vestigial hypostome; *Antricola*, again without the suture line, nymphs and adults similar, hypostome broad at base and scoop-like; *Ornithodorus*, again without the suture line, nymphs and adults similar, hypostome never scoop-like. Under this classification *Ornithodorus megnini*, the spinose ear tick, becomes *Otobius megnini*. Some description of the bionomics of this tick is given, but for the majority of species, little information is given except for their geographical distribution, and the hosts which they infest.—U. F. RICHARDSON.

RILEY, W. A. [University of Minnesota]. (1943). **Introduction to the study of animal parasites and parasitism.** pp. iii + 87. Minneapolis, Minn.: Burgess Publishing Co. [5th revision] [4to] **1368**

This work is the fifth revision and expansion of the "*Introduction*" which, the author states, has long been used in his classes. It is designed principally as a guide for students rather than as a text-book, and is supplemented by a bibliography of 14 pages. It deals with the subject primarily from the biological viewpoint, the examples being mainly drawn from the field of human parasitology. Amongst the subjects concisely dealt with in a general introductory part are definitions, occurrence of parasites, morphological and biological adaptations to the parasitic habit, life history, host-parasite specificity, reproduction of parasites, sources of infections, portals of entry to the host, the action of parasites on their hosts and the reaction of the latter, the determination of parasites in the living host, and methods of control.

The main part of the work consists of a review of the parasitic Protozoa, including organisms of uncertain affinities, such as *Bartonella*, *Toxoplasma*, and spirochaetes, and of the Platyhelminthes, Nemathelminthes, Hirudinea, and Arthropoda. Although the majority of species dealt with are those reported from man, there are included some of veterinary interest. The information about the latter is brief and there are notable omissions, such as members of the Anoplocephalidae, Strongylidae, Trichostrongylidae, Metastrongylidae, and many others which are of importance in animals.

The section on Arthropods is, according to a footnote, largely based on the text-book of medical entomology published by the author and O. A. Johannsen in 1938. Three groups of arthropods which may affect health are defined as those that are poisonous, those that are parasitic, and those that transmit and disseminate

disease. The five classes into which the arthropods are usually divided are discussed, and the main characters of the orders and families of arachnids and insects connected with human and animal health are mentioned. Information, which at times is somewhat telegraphic in its brevity, is given on the diseases or injuries which the noxious species transmit or cause, together with notes on hosts, geographical distribution, life history, control, and other points of interest.

The booklet is a multigraphed production with the textual matter on one side only of the page. The binding consists merely of a spiral wire so that, when opened, the pages lie completely flat. Spelling mistakes are, fortunately, not numerous, but a few do occur. The spellings of scientific names are occasionally not consistent, *e.g.*, that of the giant kidney worm which is given as *Dioctophyme renalis* on p. 5 and as *D. renale* on p. 47. The accepted name of the gapeworm is *Syngamus trachea* (Montagu, 1811); the author appears to prefer *S. trachealis* Sieb., 1836 (p. 47). Amongst the Protozoa one notes that *Babesia bovis* is given as the cause of Texas fever (p. 5) and as a synonym of *Piroplasma bigeminum* (p. 23). On p. 70 the omission of "with wings" after the word "flies" makes complete nonsense of the first sentence describing tsetse flies, while on p. 57 it is to be regretted that, under *Sarcoptes scabiei*, the distribution of the pedunculate suckers on the legs is given for the female only and that in an ambiguous manner. One adverse criticism that might be levelled at the bibliography is that some of the references to scientific papers cited in the textual matter have been omitted.—J. N. OLDHAM.

—. (1943). **Biological Symposia. Volume X. Frontiers in cytochemistry. The physical and chemical organization of the cytoplasm.** [Edited by HOERR, N. L. (Henry Wilson Payne Professor of Anatomy, School of Medicine, Western Reserve University)]. pp. vii + 334. Numerous figs., tables. [Numerous refs.] Lancaster, Pa.: The Jaques Cattell Press. [8vo] [$3.50] **1369**

This volume, a collection of reviews dealing with "the physical and chemical organization of cytoplasm", is the published record of a symposium held in honour of Dr. R. R. Bensley, Emeritus Professor of Anatomy of the University of Chicago, on his 75th birthday. Studies relating to the separation, isolation, and examination of the particulate components of protoplasm, constitute the major portion of the book and techniques involving the use of the high-speed centrifuge, a valuable research tool in this field, are discussed in many of the articles. Bensley himself played a considerable part in the development of many of these methods and his work on the nature of protoplasm had a decided influence on the transition from the old "solution hypothesis" to the modern view of a continuum in which the structural units are regarded as forming a continuous net. His most important contribution was the discovery of plasmosin, a protein concerned with the gelatin of protoplasm: this substance, in conjunction with ellipsin, an insoluble complex of proteins concerned with structural integrity, is regarded as the basis of all protoplasmic material.

The volume as a whole represents a useful account of pioneer work in a fundamental and difficult field of biological science. The 14 contributions to the symposium deal with such subjects as the chemical structure, components, inclusion bodies, and biologically active macromolecular particles of cytoplasm, the distribution of minerals throughout the cytoplasmic structure, cell nucleic acids, oxidation-reduction systems in the study of cellular respiration, histochemical analysis of nerve cells after axon section, and chromatin and protoplasmic fibril structure.—J. LOCHIEL MCGIRR.

—. (1943). **Modes of drug action. A general discussion held by the Faraday Society, September, 1943.** pp. 319–446. London & Edinburgh: Gurney & Jackson. [8vo] [15s.] **1370**

The papers and discussions at this meeting have already been published in the *Trans. Faraday Soc.* **39**. Part 12 (1943), and those relating to the subjects covered by this bureau have been dealt with [see *V. B.* **14**. 395–396].

They have now been published as a book and in this form constitute a valuable reference work.

FISHER, R. A. [Sc.D., F.R.S., D.Sc. (Ames, Harvard), LL.D. (Calcutta), Arthur Balfour Professor, University of Cambridge]. (1944). **Statistical methods for research workers.** pp. xv + 350. London & Edinburgh: Oliver & Boyd. [8vo] [9th Edit.] [16s.] **1371**

The use of statistical methods by workers in the biological sciences has by now become a necessary factor in the correct interpretation of their experimental results. Yet it is only during the past twenty years that the average biologist has become statistics conscious, both in the design and the interpretation of his experiments, and it is perhaps no mere coincidence that it is during this period that Fisher's "Statistical Methods for Research Workers" has become generally available in its various editions. During this time the book has certainly been used by countless numbers of workers and new editions have appeared regularly every two or three years in response to the ever increasing demand. In its own particular line "Fisher" is now rightly regarded as a classic, and with each edition, without departing from his original design of the general layout of the book, the author has introduced new material in accordance with the natural and logical development of the subject.

In this edition, the ninth, a new section has been introduced, dealing with the test of homogeneity of evidence used in estimation. The numbers of the sections, tables and examples have not been altered with the addition of new material throughout the various editions so that references to them are valid irrespective of the edition in use.

The application of the principles of experimentation has become so increasingly important of recent years that to give due weight to this aspect of the subject it would have been necessary to expand Chapter VIII inordinately; in consequence the author has developed this into a separate book, "The Design of Experiments" already in its third edition. The tables have likewise been expanded and incorporated into an independent publication, "Statistical Tables". These two books have relieved the present work of material, which, however valuable, would tend to make it unwieldy.

The present is the second wartime edition, and it is pleasing to state that the paper quality, printing and binding of this issue approach more nearly to peacetime standards than those of the previous edition.—A. E.

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INDEX VETERINARIUS

The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

The latest list of the publications indexed for this purpose was included in *Index Veterinarius*, Vol. 6, No. 1 (issued December, 1938) and also circulated with the *Veterinary Bulletin*, Vol. 9, No. 1.

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